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TSCA Modernization Act passes
the House

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Trends in Environmental Law Scholarship 2008–2014

ENVIRONMENTAL LAW AND POLICY ANNUAL REVIEW

2014-2015

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About ELR® . . .

ELR—*The Environmental Law Reporter*® is an essential online research tool edited by attorneys that provides the most-often cited analysis of environmental, sustainability, natural resources, energy, toxic tort, and land use law and policy. *ELR* has three components:

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- *ELR UPDATE* provides expert summaries three times a month of the most important federal and state judicial and administrative developments as well as federal legislative and international news. Subscribers can also receive *ELR Daily Update*, our daily summary of federal administrative news.

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ELR invites readers to submit articles and comments, which are shorter features, for publication. Manuscripts may be on any subject of environmental, sustainability, natural resources, energy, toxic tort, or land use law or policy. Citations should conform to *A Uniform System of Citation* (the "Bluebook") and should include *ELR* citations for materials that we have published.

Manuscripts should be submitted by e-mail attachment to austin@eli.org. We prefer that the file be in WordPerfect® or Microsoft Word® format.

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The Environmental Law and Policy Annual Review

Dear Readers:

The Environmental Law and Policy Annual Review (ELPAR) is published by the Environmental Law Institute's (ELI's) *Environmental Law Reporter* (ELR) in partnership with Vanderbilt University Law School. ELPAR provides a forum for the presentation and discussion of the best environmental law and policy-relevant ideas from the legal academic literature each year. The publication is designed to fill the same important niche as *ELR* by helping to bridge the gap between academic scholarship and environmental policymaking.

ELI and Vanderbilt formed ELPAR to accomplish three principal goals. The first is to provide a vehicle for the movement of ideas from the academy to the policymaking realm. Academicians in the environmental law and policy arena generate hundreds of articles each year, many of which are written in a dense, footnote-heavy style that is inaccessible to policymakers with time constraints. ELPAR selects the leading ideas from this large pool of articles and makes them digestible by reprinting them in a short, readable fashion accompanied by expert, balanced commentary. The second goal is to improve the quality of legal scholarship. Academicians have strong incentives to write theoretical work that ignores policy implications. ELPAR seeks to shift these incentives by recognizing scholars who write articles that not only advance legal theory, but also reach policy-relevant conclusions. By doing so, ELPAR seeks to induce academicians to generate new policy-relevant ideas and to improve theoretical scholarship by providing incentives for them to account for the hard choices and constraints faced by policymakers. The third and most important goal is to provide a first-rate educational experience to law students interested in environmental law and policy.

To select articles for inclusion in ELPAR, the ELPAR Editorial Board and Staff conducted a key word search for "environment!" in an electronic database. The search was limited to articles published from August 1, 2013, through July 31, 2014, in the law reviews from the top 100 *U.S. News and World Report*-ranked law schools and the environmental law journals ranked by the Washington & Lee School of Law. Journals that are solely published online were searched separately. Student scholarship and non-substantive content were excluded.

The students and their faculty advisors then screened articles for consistency with the ELPAR selection criteria. They included only those articles that met the threshold criteria of addressing an issue of environmental quality and offering a law or policy-relevant solution. Next, they considered the articles' feasibility, impact, creativity, and persuasiveness.

Through discussion and consultation, the students ultimately chose 17 articles for review by the ELPAR Advisory Board. The Advisory Board provided invaluable insights on article selection. Vanderbilt University Law School Professor Michael Vandenbergh, ELI Senior Attorney Linda Breggin, *ELR* Managing Editor Rachel Jean-Baptiste, and *ELR* Editor-in-Chief Scott Schang also assisted in the final selection process. Comments on the selected papers then were solicited from practicing experts in both the private and public sectors.

On April 10, 2015, on Capitol Hill, ELI and Vanderbilt cosponsored a conference where some of the authors of the articles and comments presented their ideas to an audience of business, government (federal, state, and local), think tank, media, and nonprofit representatives. The conference was structured in a manner that encouraged dialogue among presenters and attendees. Audio recordings of these events are posted on the ELI and Vanderbilt University Law School ELPAR websites.

The students worked with the authors to shorten the original articles and to highlight the policy issues presented, as well as to edit the comments. Those articles and comments are published here as ELPAR, which is also the August issue of *ELR*. Also included in ELPAR is an article on trends in environmental legal scholarship, which is based on the data collected through the ELPAR review process. We are pleased to present the results of this year's efforts.

Linda K. Breggin, Senior Attorney, Environmental Law Institute,
Adjunct Professor of Law, Vanderbilt University Law School

Jay Austin, Acting Editor-in-Chief, *Environmental Law Reporter*

Michael P. Vandenbergh, David Daniels Allen Distinguished Chair
of Law, Vanderbilt University Law School

Rethinking Sustainability to Meet the Climate Change Challenge

Edited by Jessica Owley and Keith H. Hirokawa

Has the concept of sustainability as we know it reached the end of its useful life? Sustainability means many things to many people, but it has been a positive driving force across all levels of society in a broad-based effort—either through laws and treaties or voluntary action—to keep our planet and our people healthy. But none of those efforts have managed to prevent climate change. It's a reality that's here to stay, and it's bigger than we would have imagined even 20 years ago.

This collection of essays from experts in the field articulates a wide range of thoughtful ways in which conceptions of sustainability need to be reexamined, refined, or articulated in greater detail to address the climate challenge. As the editors note, one of the main challenges is the need for a better understanding of the issues at the intersection of sustainability and climate change and developing the proper means of communicating them. This important work takes critical steps toward reimagining sustainability in the era of climate change.

About the Editors

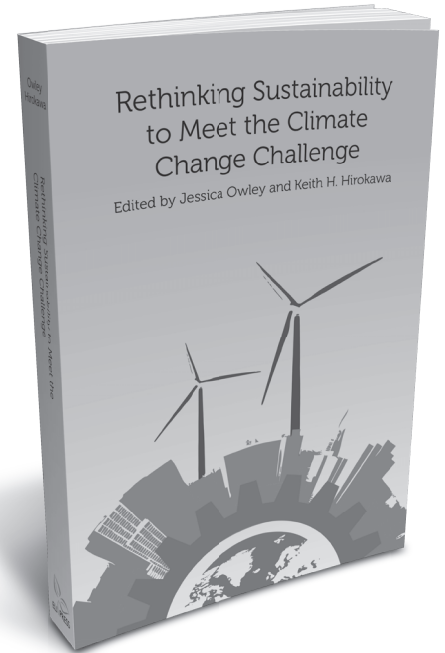
Jessica Owley is an associate professor of environmental law, federal Indian law, property, and land conservation at the SUNY Buffalo Law School.

Keith Hirokawa is an associate professor at Albany Law School, where he teaches courses involving environmental and natural resources law, land use planning, property law, and jurisprudence.

Review

"There is no better critique of sustainable development in print today than these 14 essays by scholars of the Environmental Law Collaborative. Their discerning insights expose inadequacies inherent in how the diverse and competing concepts of sustainable development can cope with climate disruptions. Has the law and policy associated with sustainable development become a maladaptation, increasing socioeconomic and ecological vulnerability? The work is provocative and timely. Profs. Owley and Hirokawa have deftly edited a well-annotated book that is essential in assessing whether sustainable development can address—or survive—the problems of climate disruption."

—**Nicholas A. Robinson, Gilbert & Sarah Kerlin Professor of Environmental Law Emeritus,
Pace University School of Law**



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C O M M E N T

Trends in Environmental Law Scholarship 2008-2014

by Linda K. Breggin, Jamieson Brock, Clarke Agre, and Michael P. Vandenberg

Linda K. Breggin is a Senior Attorney with the Environmental Law Institute and an Adjunct Professor at Vanderbilt University Law School. Jamieson Brock is a recent graduate of Vanderbilt University Law School. Clarke Agre is a recent graduate of Vanderbilt University Law School. Michael P. Vandenberg is the David Daniels Allen Distinguished Professor of Law and Co-Director of the Energy, Environment, and Land Use Program at Vanderbilt University Law School.

The Environmental Law and Policy Annual Review (ELPAR) is published by the Environmental Law Institute's (ELI's) *Environmental Law Reporter* in partnership with Vanderbilt University Law School. ELPAR provides a forum for the presentation and discussion of the best ideas about environmental law and policy from the legal academic literature.

As part of the article selection process each year, Vanderbilt University Law School students assemble and review the environmental law articles published during the previous academic year. In this Comment, we draw on the results of the ELPAR article selection process to report on trends in environmental legal scholarship for academic years 2008–2014.

Specifically, this Comment reports on the number of environmental law articles published in general law reviews and environmental law journals. We find that although the precise totals varied from year to year, more than 400 environmental law articles were published each year during the 2008–2014 period. Additionally, this Comment provides data on the topics covered in the environmental law articles reviewed by the ELPAR staff. The goal is to provide an empirical snapshot of the environmental legal literature and to track trends over time.

I. Methodology

A detailed description of the methodology is posted on the Vanderbilt University Law School and Environmental Law Institute ELPAR websites.¹ In brief, the search for articles that qualify for ELPAR review is limited to articles published from August 1 of the prior year to July 31 of the current year, roughly corresponding to the academic year. The search is conducted in law reviews from the top 100

law schools as ranked by *U.S. News and World Report* in its most recent report, counting only articles from the first 100 schools ranked for data purposes (i.e., if there is a tie and over 100 schools are considered top 100, those that fall in the first 100 alphabetically are counted). Additionally, environmental law journals as listed most recently by Washington & Lee University School of Law are searched, with certain modifications.²

The ELPAR Editorial Board and Staff start with a keyword search for “environment!” in an electronic legal scholarship database.³ Articles without a connection to the natural environment (e.g., “work environment” or “political environment”) are removed, as are book reviews, eulogies, non-substantive symposia introductions, case studies, editors’ notes, and student scholarship. We recognize that all ranking systems have shortcomings and that only examining top journals imposes limitations on the value of our results. Nevertheless, this approach provides a snapshot of leading scholarship in the field.

For purposes of tracking trends in environmental scholarship, the next step is to cull the list generated from the initial search in an effort to ensure that the list contains only those articles that qualify as environmental law articles. Determining whether an article qualifies as an envi-

1. *Environmental Law Institute*, <https://www.eli.org/environmental-law-and-policy-annual-review/publications> (last visited June 10, 2015); *Environmental Law & Policy Annual Review Online Supplements*, <http://law.vanderbilt.edu/academics/academic-programs/environmental-law/environmental-law-policy-annual-review/index.php> (last visited June 10, 2015).

2. *Law Journals, Submissions, and Rankings Explained*, Washington & Lee Univ. Sch. of Law, <http://www.lawlib.wlu.edu/LJ/method/asp> (last visited Apr. 12, 2014).

3. For the purposes of this analysis, an article is “published” only if it was available on Westlaw on the date the search was conducted. In the spring semester, ELPAR members conduct a search for articles published between August 1 and December 31 of the previous year. In the fall semester, members search for articles published between January 1 and July 31 of that year. Therefore, “embargoed” journals, which are only available on Westlaw after a delay, as well as journals that are published on a date after their “publication date” as listed by Westlaw, are not included for selection by ELPAR and are not counted for trends data purposes. The exact date of access for each journal varies according to when each individual ELPAR member performed the searches on their assigned journals, but the spring searches were performed in the third week of January, 2014, and the fall searches were performed in the third week of August, 2014. Law reviews of schools added to the *U.S. News and World Report* Top 100 are searched for the entire year in the fall, and schools removed from the top 100 after the spring search are not considered for trends data.

ronmental article is more of an art than a science, and our conclusions should be interpreted in that light. We have attempted, however, to use a rigorous, transparent process. Specifically, an article is considered an “environmental law article” if environmental law and policy are a substantial focus of the article. The article need not focus exclusively on environmental law, but environmental topics should be given more than incidental treatment and should be integral to the main thrust of the article. Many articles in the initial pool, for example, address subjects that influence environmental law, including administrative law topics (e.g., executive power and standing), or tort law topics (e.g., punitive damages). Although these articles may be considered for inclusion in ELPAR, they are not included for purposes of tracking environmental law scholarship, because the main thrust of the articles is not environmental law.

Each article in the data set is categorized by environmental topic to allow for tracking of trends by topic area. The 10 topic categories are from the *Environmental Law Reporter's* subject-matter index: air, climate change, energy, governance, land use, natural resources, toxic substances, waste, water, and wildlife.⁴ ELPAR editors assign articles into a primary topic category and, if appropriate, a secondary category.

The ELPAR Editorial Board and Staff work in consultation with the course instructors, Professor Michael P. Vandenberg and ELI Senior Attorney Linda K. Breggin, to determine whether articles should be considered environmental law articles and how to categorize the articles by environmental topic for purposes of tracking scholarship. The articles included in the total for each year are identified on lists posted on the Vanderbilt University Law School website.⁵

II. Data Analysis on Environmental Legal Scholarship

During the 2013–2014 ELPAR review period (July 31, 2013 to August 1, 2014), 444 environmental law articles written by professors or practitioners were published in

top law reviews and environmental law journals. This is an increase of over 10 percent from the 402 articles in the previous ELPAR review cycle (2012–2013). By comparison, 452 articles were published in 2011–2012, 512 articles were published in 2010–2011, 475 articles were published in 2009–2010, and 455 articles were published in 2008–2009.

Of the 444 total environmental law articles published in 2013–2014, 301 were published in journals that focus on environmental law, and 143 were published in general law reviews. The 143 environmental law articles published in general law reviews in 2013–2014 compares to 93 articles in 2012–2013, 115 articles in 2011–2012, 80 articles in 2010–2011, 97 articles in 2009–2010, and 47 articles in 2008–2009. Overall, the results this year as compared to last year indicate a decrease in the number of articles published in environmental law journals and an increase in the number of environmental articles published in general law reviews, but it is unclear if this is a long term trend or simply a matter of annual variability.

The primary topics of the 444 articles published in 2013–2014 were as follows: governance⁶ (124), energy (69), water (57), climate change (49), land use (41), wildlife (37), natural resources (20), waste (19), toxic substances (15), and air (13). When counting both primary and secondary topic categories of articles, there were 212 articles in governance, 92 in energy, 73 in climate change, 71 in water, 64 in land use, 48 in wildlife, 43 in natural resources, 26 in toxic substances, 24 in waste, and 18 in air.

The most common primary topic from 2008–2011 was climate change, but for the fourth cycle in a row, the number of climate change articles has decreased. In contrast, the number of energy articles has increased nearly every year ELPAR has been published.

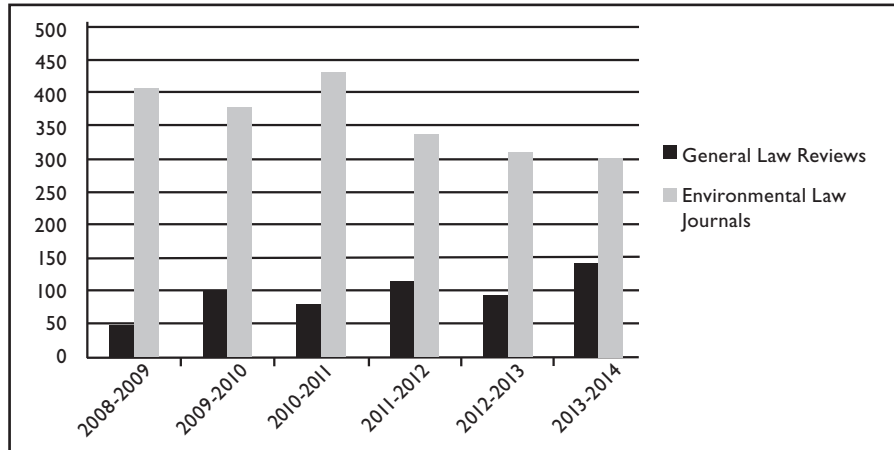
In 2013–2014, governance remained the most common topic category. Energy articles were second, followed by water and climate change. More waste articles and wildlife articles were published in 2013–2014 than in any academic year since the trends data were collected as part of ELPAR (2008–2009).

4. *Environmental Law Reporter*, <http://www.elr.info/subject-matter-index> (last visited May 6, 2015).

5. *Environmental Law & Policy Annual Review Online Supplements*, <http://law.vanderbilt.edu/academics/academic-programs/environmental-law/environmental-law-policy-annual-review/index.php> (last visited June 10, 2015).

6. The ELR subject matter index includes subtopics for each topic. Subtopics for the governance topic include: administrative law, Administrative Procedure Act, agencies, bankruptcy, civil procedure, comparative law, constitutional law, contracts, corporate law, courts, criminal law, enforcement and compliance, environmental justice, environmental law and policy, Equal Access to Justice Act, False Claims Act, Federal Advisory Committee Act, federal facilities, federal jurisdiction, Freedom of Information Act, human rights, indigenous people, indoor environments, infrastructure, institutional controls, insurance, international, liability, public health, public participation, risk assessment, stakeholder engagement, states, sustainability, tax, tort law, trade, tribes, and U.S. government. *Environmental Law Reporter*, <http://www.elr.info/subject-matter-index> (last visited May 6, 2015).

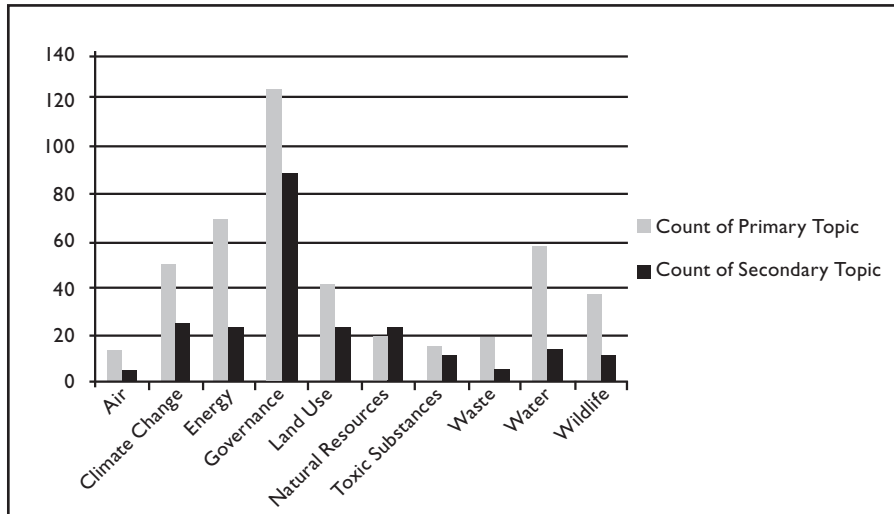
Number of Environmental Law Articles by Year



Trends in Environmental Legal Scholarship

	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
General Law Reviews	47	97	80	115	93	143
Environmental Law Journals	408	378	432	337	309	301
Total	455	475	512	452	402	444

2013-2014 Trends in Topics by Category



Number of Articles in Topic Categories by Year

Topics	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Air	5	7	10	17	17	13
Climate Change	126	151	91	71	52	49
Energy	28	44	60	52	64	69
Governance	116	87	82	125	95	124
Land Use	46	56	65	48	32	41
Natural Resources	26	22	26	27	33	20
Toxic Substances	12	20	57	22	19	15
Waste	11	14	13	13	8	19
Water	54	43	76	60	53	57
Wildlife	31	31	32	17	29	37
Total	455	475	512	452	402	444

A R T I C L E

The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy

by Thomas W. Merrill and David M. Schizer

Thomas W. Merrill is the Charles Evans Hughes Professor of Law, Columbia Law School. David M. Schizer is the Dean Emeritus and Harvey R. Miller Professor of Law and Economics, Columbia Law School.

The United States has surpassed Russia as the world's top natural gas producer and is on the threshold of overtaking Saudi Arabia as the largest oil producer. This "shale revolution" has created high-paying drilling jobs, revived the petrochemicals industry as well as other domestic manufacturing, improved our balance of payments, and increased the competitiveness of the United States in the global economy. By increasing the supply of oil and gas, fracturing has significantly reduced energy prices, enhancing consumer purchasing power and causing a more robust economic recovery. Fracturing has also reduced our reliance on energy imports and enhanced our energy security. In addition, the shale revolution has enabled the United States to reduce greenhouse gas emissions over the past several years—the largest reduction anywhere—by substituting natural gas for coal.

Fracturing is controversial. By reducing the price of natural gas, it may undercut the fledgling renewable energy industry, at least in the near term. The fracturing boom may also exacerbate air pollution, traffic, and congestion. The technology uses significant amounts of water, and some aspects of fracturing operations may induce tremors and minor earthquakes. In all these regards, fracturing is not unique, since each of these risks arises in conventional oil and gas drilling and, for that matter, in other economic activity as well.

The most unique risk associated with fracturing is potential groundwater contamination. The fluid used in fracturing contains toxic chemicals. In a sense, this risk is also

not new. Although fracturing in shale has developed in the past decade, fracturing has been used in conventional drilling for over 60 years, so that two million wells have been "fracked" in the United States. There is little evidence so far that subterranean fracturing activity can directly contaminate groundwater. The layer of shale that is fractured is usually thousands of feet below the water table, with a buffer of dense rock or clay in between. But other risks to groundwater may prove to be more meaningful, including surface spills of fracturing fluid, improper handling of waste products, and the migration of natural gas into water wells. In response, we need effective regulation. Since fracturing in shale began fairly recently, the regime for dealing with some of these risks is not yet fully developed.

This Article considers how to regulate this risk of water contamination. The task entails a careful balance of competing considerations. The shale boom offers enormous benefits and should be encouraged. At the same time, we need regulation to ensure that it is safe, since water is a vitally important resource. In addition, the public must *believe* that shale drilling is safe. Otherwise, the shale revolution could be vulnerable to regulatory overkill, as media stories about flaming water faucets, brown well water, and sickly farm animals prompt widespread public apprehension about water contamination. In order to realize the potential benefits of fracturing, we need regulation that is carefully calibrated to minimize the real risks, without deterring socially valuable drilling. This challenge is all the more difficult because fracturing can potentially contaminate water in several ways. Some are well understood from decades of conventional oil and gas production and can be controlled with best practices regulations. Others are highly speculative, may or may not present real risks, and currently have no known solutions. As a result, regulatory responses should be dynamic, generating additional information about potential risks and stimulating innovations to reduce these risks.

*The full version of this Article was originally published as: Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98 MINN. L. REV. 145 (2013). It has been excerpted and updated with permission of Minnesota Law Review and Thomas W. Merrill & David M. Schizer. Please see the full article for footnotes and sources.*

One element of our strategy is an evolving body of best practices regulations designed to reduce the risks of water contamination. To capture the advantages of best practices regulation while minimizing its disadvantages, we propose to backstop regulation with liability rules. Since determinations of causation are critical under any liability system, we recommend information-forcing rules to facilitate more accurate determinations of causation. To ensure that the regulatory regime is both dynamic and tailored to local conditions, we recommend keeping the regulatory center of gravity in the states, instead of fashioning a new federal regime.

I. Choosing a Regulatory Strategy for Water Contamination

The regulatory goal should be to support the shale revolution by steadily improving our understanding of the water contamination risks and working to reduce those risks. The best way to achieve this goal is by combining best practices regulation with liability for fracturing-related harms.

A. *The Danger of Regulatory Overkill*

We know that the prospect of groundwater contamination can motivate the public to support draconian regulatory measures. In the late 1970s, extensive publicity about toxic chemicals leaking into basements in Love Canal led Congress to enact the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).¹ Many commentators believe the cost of the response was disproportionate to the benefit.² It would be unfortunate if a similar dynamic were to stifle the shale revolution. The solution, we believe, is to adopt a sensible regime that reassures the public, motivates the industry to take appropriate precautions, and provides incentives to develop risk-reducing innovations over time.

B. *Five Possible Regulatory Strategies*

1. Prohibitions

One strategy for dealing with an environmental risk is simply to ban it. When the benefits are substantial and the risks are manageable, prohibition represents regulatory overkill. Prohibition also impedes innovation by limiting possibilities for experimentation in developing new ways to reduce the risk.

1. See Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§9601-9675 (2012).

2. See, e.g., James T. Hamilton & W. Kip Viscusi, *The Magnitude and Policy Implications of Health Risks From Hazardous Waste Sites*, in *ANALYZING SUPERFUND: ECONOMICS, SCIENCE AND LAW*, 55, 78-81 (Richard L. Revesz & Richard B. Stewart eds., 1995).

2. Command-and-Control Regulation

The oldest and most common form of command-and-control regulation mandates “best practices” to minimize external harms. This type of regulation typically requires all firms to adopt practices that reflect the “state of the art,” meaning something more stringent than common practice that is still technologically and economically feasible. The familiar downside of command-and-control regulation is that it can yield inefficient regulations, since they are usually defined by the state of existing technology instead of rigorous assessment of costs and benefits. Regulated industry often prefers command-and-control regulation over other forms of regulation because it generates relatively predictable regulatory costs.

3. Disclosure

A third strategy requires the party primarily responsible for the external risk to disclose information about it. When forced to disclose risks, firms often make changes to eliminate or reduce them.³ However, gathering and disseminating information can be costly, and information overload can be counterproductive.

4. Liability Rules

A fourth regulatory strategy levies monetary sanctions on firms that have imposed external harms on others. Common law tort liability is the most familiar example. Liability rules have two significant advantages. The first is deterrence. To avoid liability, actors have an incentive to reduce (or “internalize”) harms they are likely to cause, especially if liability is imposed on the party with the best information and expertise to minimize risks efficiently. Second, liability provides compensation to those who suffer injury.

In practice, liability rules often are accompanied by uncertainty because they operate after the harm has occurred. For this reason, it can be difficult for firms to predict the costs of their actions, leading to over- or under-deterrence.

5. Coasean Bargains

A final strategy is to regulate external harms by contract.⁴ For example, a driller could purchase both mineral rights and groundwater rights, and could agree to sell groundwater to the landowner at a specified price and quality. Coasean bargains nevertheless have significant limitations in this context. If fracturing threatens harm to parties

3. See Paul R. Kleindorfer & Eric W. Orts, *Informational Regulation of Environmental Risks*, 18 *RISK ANALYSIS* 155, 165 (1998).

4. See R.H. Coase, *The Problem of Social Cost*, 3 *J.L. & ECON.* 1 (1960).

not participating in a lease, contractual solutions become more difficult.

C. *Four Factors Influencing the Choice of Regulatory Strategy*

Is there any more systematic basis for choosing among regulatory strategies? A useful starting point is literature on *ex ante* versus *ex post* regulation. While *ex ante* regulation seeks to reduce harmful externalities *before* they occur, *ex post* regulation puts a price or sanction on harmful events *after* they occur, thereby creating an incentive to reduce their incidence. The focus of this literature is whether it is cheaper to determine optimal behavior before or after some discrete accident or other external harm has taken place.⁵ In choosing between *ex ante* and *ex post* regulation, we should minimize the sum of *ex ante* and *ex post* costs by creating incentives for optimal behavior. Four factors illuminate sources of these costs: whether the sources of the harm are heterogeneous; whether the expected harm is high; whether settlement costs of allocating responsibility *ex post* are high; and whether the technology is novel.

D. *Applying These Factors to the Risk of Water Pollution From Fracturing*

I. Heterogeneity of Risk

In controlling water pollution from fracturing, some sources of the risk are homogeneous while others are heterogeneous. Virtually *all* oil and gas production poses the risk of blowouts,⁶ leaks from vertical drill pipes into aquifers, and improper disposal of drilling waste and produced water.⁷ Best practices regulations are appropriate for this sort of issue.

For heterogeneous risks, such as the risk of fracturing fluid or methane escaping from target shale beds and migrating to aquifers, there is no one technology that can address these risks in a uniform way.⁸ Some form of *ex post* regulation is needed, at least for now.

2. Magnitude of Expected Harms

The second factor, the frequency and severity of the harm, also varies with the pathway of contamination. Activities that present an obvious risk of significant harm if not controlled are either already regulated by best practices regulations, or if not, they should be.

Other risks appear to be more remote. With fracturing fluid, for instance, alleviating uncertainty is a good reason to require disclosure of chemicals used in fracturing.

Still another factor is whether the harm will be limited to property damage or will involve health effects. If contamination is detected early, injuries should be primarily economic: the primary consequence should be a decline in property values. But if the harm is not detected early, there could be health effects that are significantly more costly.

3. Settlement Costs

A critical variable is whether the amount of injury per claimant is sufficiently large to warrant individualized assessments. If water contamination is quickly detected and results in avoidance measures that prevent significant harm, the potential damages might be too small to sustain a liability regime. Also, if significant time has elapsed between fracturing and the discovery of contamination, identifying a defendant sufficiently solvent to pay damages may be difficult. These considerations provide a reason to rely, at least in significant part, on command-and-control regulation rather than a pure liability regime.

4. Novelty of Risk

Ex ante regulation is more challenging with a novel technology because there is no baseline of existing precautions to define the “best practices” regulatory standard. With new technology there is thus a strong reason to rely at least in part on *ex post* regulation. Insofar as fracturing in shale presents water contamination risks identical to those in conventional oil and gas production—such as disposing of produced water, minimizing well casing leaks, and controlling blowouts—the risks and potential solutions are familiar, so this experience can support *ex ante* best practices regulation.

However, *ex ante* regulation is much more difficult for pathways of contamination that are novel to fracturing. For now, there is insufficient understanding of the frequency and magnitude of these risks, as well as how to minimize them, to support a system of *ex ante* regulation.

E. *The Regulatory Strategy for Water Contamination From Fracturing*

We are now in a position to draw these considerations together and propose in broad outline a regulatory strategy.

I. The Need for Both Best Practices Regulation and Liability

As a core element of our regulatory strategy, best practices regulation offers three advantages. First, it is especially well-suited to risks that are either common to all forms of oil and gas production or are familiar from other types of industrial operations. Second, the idea that a public regula-

5. See Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 572 (1992).

6. Blowouts are “gushers” or the uncontrolled release of gas or oil.

7. Produced water is briny water from deep below the earth’s surface that comes up with the oil or gas during the drilling process.

8. See SEC’Y OF ENERGY ADVISORY BD., SHALE GAS PRODUCTION SUBCOMMITTEE 90-DAY REPORT 8, 10 (2011), available at http://energy.gov/sites/prod/files/Final_90_day_Report.pdf.

tory body is “on the case” is reassuring to the public. Third, because energy companies must make substantial investments to drill in shale, they need to estimate what regulatory costs they will face. Best practices regulation offers this predictability.

However, best practices regulation has three important drawbacks, so that it must be backstopped by liability. First, best practices regulation is only as effective as the resources committed to enforcing it. Second, best practices regulation is ineffective for heterogeneous or novel risks. Third, command-and-control regulation provides relatively poor incentives to develop new risk-minimizing innovations. Liability rules provide a much more powerful incentive in this regard.

2. Three Rules to Coordinate Liability With Best Practices Regulation

Best practices regulation and liability should be coordinated, so that liability standards vary depending on whether a best practices regulation governs the conduct that caused the contamination. Specifically, we envision three different liability rules depending on compliance with best practices regulations.

First, any water contamination causally attributable to the violation of a best practices regulation should be considered negligence per se and should result in liability.

Second, any claim that water contamination was caused by the failure of an energy company to adopt a measure *more* protective than required by an applicable best practices regulation should generally be defeated by a regulatory compliance defense. These two per se rules create a powerful incentive for industry to support the development of protective best practices rules and to comply with them.

The third rule fills any gaps left by the first and second: if the water contamination is causally attributable to the defendant’s fracturing, but cannot be linked to an activity governed by a best practices rule, we would apply a version of the doctrine of *res ipsa loquitur*. In such a regulatory vacuum, proof that the energy company caused the contamination would create an inference that the firm was negligent, shifting the burden to the company to prove it exercised reasonable care. The standard of care, as a practical matter, would approach strict liability. This rule would give energy companies a strong incentive to learn how to reduce the residual risks not governed by best practices regulations and to help regulators develop new best practices regulations.

3. The Supporting Role of Prohibitions, Disclosure, and Coasean Bargains

Although we would not rely on prohibitions as the principal strategy, they are appropriate where risks are especially great. Information disclosure would also play an important, if secondary, role. Blowouts and leaks should be disclosed, as well as the chemicals used in fracturing fluid.

We also view Coasean bargains as an appropriate regulatory strategy. The problem is that *neither* the energy companies nor the landowners have definitive information about the nature and magnitude of the risks. We therefore expect at least some parties to be reluctant to allocate these risks by contract.

II. Designing a Regulatory Regime for Water Contamination

In this part, we offer more detail about our proposed regulatory regime, focusing on design of the liability rule and its interaction with best practices regulation.

A. Causation

1. Contamination Injury

For energy companies to have the right incentives, they should be liable only if they *actually cause* harm. Thus, plaintiffs should be required to prove by a preponderance of the evidence that fracturing was a but-for cause of water contamination on their property.

This showing is challenging for three reasons. First, if the plaintiff’s water well contains an unusual chemical, how do we know it comes from fracturing, as opposed to a natural cause or some other sources of pollution? Second, if several energy companies are fracturing in a given locale, how do we know which one is responsible? Third, what if contamination is discovered years after energy companies have stopped fracturing in a particular locale? These questions are difficult because the parties have only limited information.

To address these questions, the liability regime should create incentives to develop better information. We suggest three ways to pursue this “information forcing” goal,⁹ ranked in order of importance: baseline testing; disclosure; and tracer chemicals.

a. Baseline Testing

The most important step is to test groundwater before fracturing begins in order to establish a benchmark of water quality. If an allegation of contamination is made, the water would be tested again. If contaminants are found that were not present in the baseline sample, this would support the allegation that fracturing caused the contamination. Conversely, if the contaminants were already there, this would powerfully rebut such a claim.

Baseline testing cannot be conducted if landowners do not allow access to their water wells. They might be motivated by a desire for privacy or, for that matter, by a concern that any negative information they learn would have to be disclosed when they sell their property. Whatever

9. See, e.g., Bradley C. Karkkainen, *Information-Forcing Environmental Regulation*, 33 FLA ST. U. L. REV. 861 (2006).

their reasons, if landowners refuse to consent to a baseline test, they should pay a price for doing so. We would require them to overcome a presumption that the drilling activity did not cause the contamination.

b. Disclosure of Fracturing Chemicals

We should also require disclosure of all chemicals used in fracturing fluid, a step voluntarily taken by many companies and now required in a number of states.¹⁰ When paired with baseline testing, disclosure can make determinations of causation more accurate.

The primary objection to disclosure is that the composition of each energy company's fracturing fluid is a trade secret. However, the trade secret would not necessarily be compromised if companies were required to disclose only the ingredients in their fluid, but not the quantities or proportions used.¹¹

c. Tracer Chemicals

A third information forcing strategy would require energy companies to include tracer chemicals in their fracturing fluid.¹² Each energy company would include a unique but harmless and nondegradable chemical in their fracturing fluid, and would register it with the relevant regulator. If water contamination is alleged, the water would be tested for this chemical marker. If it is found, the energy company's fracturing fluid probably caused the contamination; if not, it presumably did not.

2. Pathways of Causation

Once the plaintiff establishes that fracturing activity caused the contamination, the next issue concerns *how* the water was contaminated and whether the pathway of contamination was governed by best practices regulations. We would apply different liability rules depending on whether the pathway is governed by regulations.

We suspect that direct proof of the pathway of contamination will be possible only in a subset of cases. We would allow either party to introduce such evidence. In many cases, the evidence will not reveal exactly how the water was contaminated, and thus whether a best practices regulation addressed the relevant conduct in the case. In these circumstances, if the plaintiff proves both (1) that fracturing caused the contamination, and (2) that the energy company violated a regulation governing a par-

ticular pathway of contamination, we would create a presumption that this was the pathway of contamination.¹³

3. The Scope of the Harm

In nearly all cases, the contamination will have caused property damage. Contamination that goes undetected for some time might also have caused more serious injuries.

The best we can do may be to establish additional presumptions. Specifically, (1) if an energy company has increased the concentration of a chemical in a water well; (2) the concentration exceeds the applicable maximum contaminant levels under the Safe Drinking Water Act; (3) the landowner has been exposed to the water for an appreciable period of time (e.g., at least one year); and (4) the landowner has experienced an injury associated by the U.S. Environmental Protection Agency (EPA) with exposure to the chemical, then a presumption would arise that exposure to the chemical caused the injury. The burden would shift to the energy company to rebut the presumption.

B. Standard of Care

Once issues of causation are resolved, it is necessary to specify the standard of care we will use to evaluate the energy company's conduct. Most discussions assume there are two options: strict liability and negligence.

We recommend a hybrid approach that, in form, is based on negligence, but as a practical matter would function like strict liability in many circumstances. Specifically, we recommend adopting a negligence framework requiring energy companies to conform to a standard of reasonable care that would be defined in significant part by best practices regulations.

Thus, we would apply three different standards of care depending on the circumstances: First, violation of best practices regulations would establish negligence per se (which functionally resembles strict liability). Second, compliance with best practices regulations would establish a (qualified) regulatory compliance defense. Third, if no best practice regulations govern the problem leading to the contamination—or, relatedly, if it is impossible to identify how the contamination occurred—we would apply the doctrine of *res ipsa loquitur*, which would, for practical purposes, function much like strict liability.

C. Plaintiff Fault and Releases From Liability

We do not expect plaintiff fault to be an issue in the typical water contamination case, where the energy company is active and the landowner is passive. But the issue could arise in some cases. In this sort of case, energy companies should be allowed to raise the plaintiff's comparative negligence as a defense. Liability should be apportioned between

10. See Kate Galbraith, *Seeking Disclosure on Fracking*, N.Y. TIMES (May 30, 2012), http://www.nytimes.com/2012/05/31/business/energy-environment/seeking-disclosure-on-fracking.html?_r=0.

11. See Sara Dastgheib-Vinarov, *A Higher Nonobviousness Standard for Gene Patents: Protecting Biomedical Research From the Big Chill*, 4 MARQ. INTELL. PROP. L. REV. 143, 151-53 (2000).

12. See Chris Mooney, *The Truth About Fracking*, 305 SCI. AM. 80, 80-85 (2011).

13. This is analogous to what Ken Abraham calls "self-proving causation," Kenneth S. Abraham, *Self-Proving Causation* (Univ. of Va. Law Sch. Research Paper Series, Sept. 2013), available at <http://ssrn.com/abstract=2320596>.

the plaintiff and the defendant based on how much each contributed to the contamination.¹⁴

In some cases, we would also recognize a defense of assumption of the risk. In theory, one could hold that the plaintiff assumed the risk simply by signing a mineral lease, with the expectation of sharing in oil and gas revenues. If a plaintiff has signed a lease that includes a written and prominently disclosed release of liability for water contamination, we would respect the release.

D. Measure of Damages

Any harm incurred by the plaintiff should be measured accurately. A key element of harm will be damage to the land, which ordinarily is measured by the decline in the land's fair market value. A partial solution is to let the plaintiff choose to recover the cost of restoring access to potable water.

Damages for any health effects will also have to be calculated. This sort of damages is familiar in other types of litigation.

We believe punitive damages would be appropriate for defendants who falsify reporting requirements or knowingly violate regulations insuring well integrity or preventing surface spills. However, we would preclude the award of punitive damages for defendants who are in full compliance with all best practices regulations and disclosure requirements, engage in periodic testing, and are free of any affirmative misconduct. This safe harbor rule would give energy companies an added incentive to comply with these safety-promoting rules.

E. Insolvency Risk

If insolvency turns out to be a problem, a mixed liability/government insurance regime may be needed. Any energy company that engages in fracturing could be required to contribute to a general insurance fund, which would cover the damages if the responsible energy company is insolvent. If the fund is exhausted, taxpayers would make up the difference. To mitigate moral hazard, firms should be charged experience-based fees, so that those with a record of accidents have to pay more.

III. Implementation Options

We now turn to the separate questions of which level of government should implement this regime, and which branch of government should do so. Institutions that have regulated issues in the past will have a presumptive claim to do so in the future, based on their expertise, relationships with important interest groups, and natural inclination to protect their turf.

14. To be clear, we do not recommend contributory negligence, which affords a complete defense to liability, since this might undercut defendants' incentives to take precautions.

A. Jurisdictional Scope

Currently, states have principal regulatory responsibility over oil and gas production as well as groundwater. As a result, every state where fracturing is taking place has an oil and gas commission.¹⁵ In contrast, the federal government has played almost no role in regulating oil and gas production on private land.¹⁶

A regulatory jurisdiction generally should correspond to the geographic scope of the externality, sometimes known as the "matching principle."¹⁷ Thus, the federal government should regulate interstate pollution, the states should regulate spillovers confined to a single state, and localities should regulate externalities with local effects. This assures that the regulator considers all costs and benefits of the activity without ignoring those borne by outsiders, while simultaneously preserving flexibility to account for local conditions.

Economies of scale in regulation are also important.¹⁸ The best justification for the federal role in regulating local public drinking water systems is the technical expertise required, although actual enforcement remains with the states. In regulating fracturing, then, EPA would need to build out its expertise substantially. Federal regulation also tends to be ponderously slow, perhaps in part because the stakes are higher and consequently more interest groups get involved.¹⁹ While the states have fewer resources overall, they have a significant head start in regulating oil and gas, and to a lesser extent, groundwater.

Arguably, the geographic scope of the externality favors localities, although uncertainties about the scope of contamination would perhaps warrant centering regulation in a body having a larger jurisdictional scope, like the states. Economies of scale favor the federal government. The states are a viable compromise on both dimensions, since they are closer to the externality than the federal government and have greater expertise and resources than local governments. Therefore, it is certainly reasonable—and arguably preferable—for states to take the lead in regulating the risk of water contamination from fracturing, at least for now.

B. Implementing Body

Every state in which fracturing is taking place or is contemplated has a functioning regulatory commission. Although they have varying degrees of discretionary authority to

15. Cf. Thomas E. Kurth et al., *American Law and Jurisprudence of Fracing—2012*, 58 ROCKY MOUNTAIN MIN. L. FOUND. 1, 65-154, available at <http://www.haynesboone.com/american-law-and-jurisprudence-on-fracing-2012/>.

16. See David B. Spence, *Federalism, Regulatory Lags, and the Political Economy of Energy Production*, 161 U. PA. L. REV. 431, 477 (2013).

17. See Henry N. Butler & Jonathan R. Macey, *Externalities and the Matching Principle: The Case for Reallocating Environmental Regulatory Authority*, 14 YALE L. & POL'Y REV. 23, 25 (1996).

18. See Richard B. Stewart, *Pyramids of Sacrifice? Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 YALE L.J. 1196, 1212 (1977).

19. Cf. Christopher S. Kulander, *Shale Oil and Gas State Regulatory Issues and Trends*, 63 CASE W. RES. L. REV. 1001, 1141 (2013).

adopt new regulations, all have at least some authority in matters of well construction, spacing, and safety. We assume, therefore, that state commissions with current regulatory authority over oil and gas production are the place to start.

Legislation may be needed to augment their authority. As previously discussed, regulators should be empowered to require baseline testing of water quality and to compel public disclosure of chemicals used in fracturing. In addition, commissions should be authorized to adopt best practices regulations.

A further question is who should implement the liability regime that we propose. There is much to be said for using an administrative tribunal. But at this point it is not clear that fracturing will generate water contamination at a scale that will require the adjudication of very many disputes.

Fortunately, if courts must adjudicate water contamination claims, we have an off-the-rack liability regime: the common law of torts. Admittedly, tort does not have all the features we would ideally like to see in an *ex post* liability regime, such as insolvency protections. Nevertheless, it is sufficiently flexible to replicate many aspects of this proposal. In addition to its capacity to accommodate our proposal, the common law has the added virtue of already addressing any issue that a liability regime is likely to face, including defenses based on plaintiff misconduct, joint and several liability, the measure of damages, and the enforcement of judgments.

IV. Conclusion

Fracturing is transforming the energy landscape of the United States. By unlocking massive reserves of natural gas

and oil in shale beds and other tight rocks, fracturing is creating drilling jobs, fueling a revival of domestic manufacturing, strengthening consumer purchasing power, improving our balance of payments, enhancing our energy independence, and reducing U.S. greenhouse gas emissions.

Yet at the same time, fracturing poses a number of risks. Some arise in conventional oil and gas drilling as well as in other economic activities, such as competition with renewable energy, traffic and congestion, air pollution, the use of significant amounts of water, and the risk of inducing earthquakes. Fracturing also poses unique risks of water contamination, which are the focus of this Article. Although there is only limited evidence of water contamination from fracturing so far, the risks are not yet fully understood and mechanisms for regulating them are not yet fully developed. We offer a general framework for regulating in the face of uncertainty and apply it to water contamination for fracturing.

A core element of our proposal is best practices regulation. We can encourage the development of a robust practices regime by backstopping it with liability. Under our proposed liability regime, unless an energy company is in full compliance with applicable best practices regulations, it generally would have to pay for any water contamination harms caused by fracturing operations. In addition, we believe our proposed regime should be implemented at the state level. A realistic option, at least in the near term, is to adapt the existing common law of torts to the unique problems posed by fracturing. This blended strategy can perform the vital function of protecting our water resources, while also harnessing the substantial economic, national security, and environmental advantages of the shale oil and gas revolution.

C O M M E N T

The Critical Role of Voluntary Standards and Certification in the Hydraulic Fracturing Framework

by Susan Packard LeGros

Susan Packard LeGros is the President and Executive Director, Center for Sustainable Shale Development (CSSD), Pittsburgh, Pennsylvania. The views and opinions expressed in this Comment are those of the author and do not represent the views of CSSD or its participating organizations.

The article by Professor Merrill and Dean Schizer¹ sets out a reasoned structure for addressing the risks to surface and groundwater resources associated with shale gas development. It suggests that, at a minimum, where leading or best practices have been identified to address known risks, these practices should be incorporated into regulation. As a practical matter, this means state regulation because it is at the state level where these issues are primarily regulated. The article acknowledges that there are potential risks for which best practice is not known, and for that set of challenges the legal system must formulate an evolving approach to addressing responsibility. It suggests application of well-established principles of liability to address areas of risk not yet capable of being distilled into regulation.

There is a long time line involved in incorporating best practices into multiple state regulations. It is not an exaggeration to say that it could take decades accompanied by inconsistency across jurisdictions for that to be accomplished. Yet, even as that effort progresses, the engineering and operational practices associated with fracturing and the scientific studies of impact are altering the information on which best practices are based. Without disputing the need for a strong and scientifically based regulatory program, there is a faster and more adaptive approach to advance and incorporate best practices.

While the article acknowledges the existence of programs involving voluntary standards, these programs have particular application to the fast-changing subject of shale gas. Voluntary standards can advance timely identification of best practices and likely represent the best way to accomplish widespread adoption in a short period of time. In addition, independent certification programs can support the integrity of best practices and voluntary standards

by providing the public with information and transparency that are necessary to engender a level of confidence that the standards are meaningful.

Various articles have examined the contribution that voluntary standards organizations can make at a time when there has been no new environmental legislation since 1994 and any environmental regulation is almost inevitably going to face a gauntlet of challenge.² Given the current landscape, the role of a voluntary standards organization becomes more critical and, arguably, more necessary.

Multiple organizations have adopted various versions of best or recommended practices in shale gas extraction and production.³ Some of these are aspirational, identifying “relevant considerations” and guidelines; others are prescriptive and include specific metrics.⁴ The experience of the Center for Sustainable Shale Development (CSSD) is instructive of the challenges such initiatives face as well as the potential for impact. CSSD is a non-profit organization formed in 2011 to respond to the growing need for responsible approaches to the prospect of shale gas development in the Appalachian Basin, which includes the Marcellus and Utica Plays.

CSSD followed an initial effort led by a group of shale operators, foundations, and regulators assembled by the University of Pittsburgh’s Institute on Politics that began meeting in 2010 to explore issues related to Marcellus Shale exploration. Seeking to elevate and inform the regional energy dialogue, the Shale Gas Roundtable, as they named

1. Thomas M. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98 MINN. L. REV. 145 (2013).

2. See, e.g., Michael P. Vandenbergh, *The Emergence of Private Environmental Governance*, 44 ELR 10125, 10131-32 (Feb. 2014); Michael P. Vandenbergh, *Private Environmental Governance*, 99 CORNELL L. REV. 129, 131 (2013).

3. See, e.g., AMERICAN PETROLEUM INSTITUTE STANDARDS, <http://www.api.org/publications-standards-and-statistics/standards> (last visited June 4, 2015).

4. Compare MARCELLUS SHALE COALITION, RECOMMENDED PRACTICES: DRILLING AND COMPLETIONS 2 (Sept. 24, 2013), available at <http://marcelluscoalition.org/category/library/recommendedpractices>, with EQUITABLE ORIGIN, <http://www.equitableorigin.com> (last visited June 4, 2015).

themselves, identified a three-part mission related to unconventional oil and gas production, transport, and use:

- Building and sustaining relationships among relevant cross-sector stakeholders to better support diverse regional environmental protection, community quality of life, and economic development goals
- Identifying high-priority focus areas through consensus-building, dialogue, extensive research, and shared goals for the region
- Assessing the focus areas and developing ideas and recommendations that promote the improved management of and outcomes from regional unconventional oil and gas development and activities.

Seeking the best possible balance between environmental organizations and the Pennsylvania Department of Environmental Protection (DEP), they encouraged the agency to strengthen engagement with and support of cross-sector and industry efforts to develop best management practices:

DEP should continue its engagement with and support of various multi-stakeholder and industry efforts to develop best management practices (BMPs) and high-level performance standards. As appropriate, these practices/standards should be considered for incorporation into future revisions of relevant regulations and guidance documents to ensure continual improvement of industry operations.⁵

At about the same time, The Shale Gas Production Subcommittee of the Secretary of Energy Advisory Board issued its report identifying measures to reduce the environmental impact and enhance the safety of shale gas production.⁶ Among its conclusions was the finding that:

[C]reation of a shale gas industry production organization dedicated to continuous improvement of best practice through development of standards, diffusion of these standards, and assessing compliance among its members can be an important mechanism for improving shale gas companies' commitment to safety and environmental protection as it carries out its business.⁷

The Report suggests that such an organization be governed by a board of directors composed of member companies on a rotating basis, along with external members, for example, from NGOs and academic institutions.

One of the Subcommittee's recommendations was the need to organize for continuous improvement of "best practice," defined as "industry techniques or methods that have proven over time to accomplish given tasks and objectives in a manner that most acceptably balances desired

outcomes and avoids undesirable consequences."⁸ Continuous best practice refers to:

the evolution of best practice by adopting process improvements as they are identified, thus progressively improving the level and narrowing the distribution of performance of firms in the industry. Best practice is a particularly helpful management approach in a field that is growing rapidly, where technology is changing rapidly, and involves many firms of different size and technical capacity.⁹

Importantly, best practice does not mean a single process or procedure but allows for a range of practices that may be equally effective at achieving desired outcomes.

Similarly, the International Energy Agency's (IEA's) Golden Rules for a Golden Age of Gas includes as their first rule "Measure, Disclose, and Engage":

The public does not have reliable and up-to-date information about unconventional and shale gas operation. Data on water and air quality should be measured before the start of operations and monitored throughout operations. The type, volume, and effects of the chemicals being used in unconventional gas production ought to be made available. Engagement with communities is important and local communities should feel benefits from the operations.¹⁰

CSSD was formed to build upon the needs identified in these efforts for industry leadership and dialogue with community and environmental stakeholders. Its structure and by-laws present a template for other similar organizations. The mission of the organization is to bring together environmental, industry, and community organizations committed to ensuring the highest level of environmental and community responsibility when a decision is made to develop and extract shale gas. CSSD does not involve itself in decisions about where and when to extract gas—that is up to the individual companies and governmental authorities responsible for permitting and other authorizations. When the decision is made to extract gas, our focus is on how to do it right.

The original founding partners included four producers: CONSOL, Chevron, EQT Corporation, and Shell; and five environmental NGOs: Clean Air Task Force, Environmental Defense Fund (EDF), Group Against Smog and Pollution (GASP), Pennsylvania Environmental Council, and Pennfuture. Startup funding was provided by The Heinz Endowments and the William Penn Foundation.

The 12-member Board has equal numbers of representatives of industry, environmental, and civil society to ensure balanced input and concurrence of approach. Best practices

5. SHALE GAS ROUNDTABLE: DELIBERATIONS, FINDINGS, AND RECOMMENDATIONS 10 (Aug. 2013), available at <http://www.iop.pitt.edu/shalegas/PDF/90696%20SHALE%20GAS%20FULL%20REPORT-final.pdf>.

6. SEC'Y OF ENERGY ADVISORY BD., SHALE GAS PROD. SUBCOMM. NINETY-DAY REPORT, (Aug. 11, 2011), available at http://www.shalegas.energy.gov/resources/081111_90_day_report.pdf.

7. *Id.* at 27.

8. *Id.* at 26.

9. *Id.*

10. Carlos Pascual et al., *Golden Rules for a Golden Age of Gas*, CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE (June 1, 2012), <http://carnegieendowment.org/2012/06/01/golden-rules-for-golden-age-of-gas>; see also INT'L ENERGY AGENCY, GOLDEN RULES FOR A GOLDEN AGE OF GAS 43 (2012), available at http://www.worldenergyoutlook.org/media/weoweb-site/2012/goldenrules/WEO2012_GoldenRulesReport.pdf.

are considered and recommended by a Standards Committee of representatives from the environmental and industry organizations and become effective only upon unanimous adoption by the Board. This ensures that any performance standard reflects the concurrence of all groups represented. To date, CSSD has adopted 15 performance standards addressing such subjects as impoundments, wastewater treatment and recycling, flaring, compressors, and pre- and post-drilling monitoring, all drafted to exceed the baseline of existing regulations.

From the outset, NGO and philanthropic representatives held that merely promulgating best practices was not sufficient—there had to be a process for independent auditing and inspection of gas producers to certify the standards were met, and the auditing process needed to be as transparent as possible. To implement this goal, CSSD adopted written standard-by-standard guidance to be used by auditors, standards for training and accreditation of auditors, and a verification protocol specifying the duration and scope of audits. All of these documents are provided for public review on the CSSD website. Certification is open to any producer willing to undergo the rigorous third party desk and field audits required. To date, CSSD has certified three producers as meeting these highest of standards. Certification is effective for two years, with at least one interim audit taking place during that two-year period.

Why would producers choose to participate in this type of program? The justification offered by the article for best practices regulation applies equally to voluntary

standards—“[T]he entire industry has a strong stake in promoting public confidence in shale oil and gas drilling, and in assuring that actions of a few irresponsible companies do not jeopardize the entire industry.”¹¹ Another reason is that, given the hodgepodge of state regulations across multiple jurisdictions, meeting voluntary standards is a way of obtaining greater substantive and cost certainty. Regulations, administrations, and agency priorities and interpretations may change, but a company’s commitment to best practices as a guidepost assures it will achieve no less, and often significantly more than what is required by regulation. From the standpoint of the regulated community, commitment to best practices backstops the possibility that administrative agency cuts in funding or personnel will undermine government’s ability to incorporate best practices into regulatory updates or to maintain rigorous enforcement. Finally, voluntary regulation provides the flexibility to innovate—something that is more difficult to do in a prescribed regulatory regime. A voluntary program offers participants the ability to experiment with different approaches to best practices without necessarily requiring regulatory approval.

The shifting economic, regulatory, political, and operational landscape of shale gas development requires regulatory approaches that are timely, flexible, and adaptive. Voluntary standards, particularly those that incorporate diverse perspectives, are a path toward responsible and constructive leadership that can inform and support development of a reasoned regulatory and legal structure.

11. Merrill & Schizer, *supra* note 1, at 223.

C O M M E N T

Comment on *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination*

by Peter D. Robertson

Peter D. Robertson is Senior Vice President for Corporate Affairs for the Pebble Partnership.

I think Professor Merrill and Dean Schizer have made a very thoughtful proposal which has genuine merit and deserves equally thoughtful consideration by states across the country. I have a series of what are essentially random reactions, thoughts, and suggestions, but they all flow from a fundamental position that their suggestions are an excellent model for states to consider as they adopt new or update old regulatory and liability regimes. My observations, of course, spring from my varied experiences in the environmental arena. I worked at the U.S. Environmental Protection Agency (EPA) for six years and I support its mission as strongly now as I did then. I also worked at a trade association for the independent natural gas producers—the companies that produce the majority of the natural gas in our country today. I am the yellowest of yellow dog Democrats, and I desperately want renewable energy resources to succeed and become a much bigger part of our energy equation. But I also believe that won't happen for some time, and that we are going to have to continue to burn fossil fuels for the foreseeable future; if I'm right about that, I want us to burn the cleanest of those fuels—natural gas—to the greatest degree possible. And I want us to get that gas out of the ground in the most sustainable way possible.

The authors' remarks make clear to me that they believe that the shale revolution of the last decade is, essentially, a good thing, and that any efforts to create regulatory and liability schemes should strive to do so in a way that does not kill this engine of economic opportunity. I certainly agree with that, and think generally that their proposals are well-suited to ensure the continuing vibrancy of the natural gas industry.

The authors also note that so far, there is little evidence that fracking contaminates groundwater, and especially that fracking activity itself—as compared to surface spills of fracking fluids or mishandling of fracking wastewaters—is a likely source of groundwater contamination. They also note that the public must believe that shale drilling is safe, or the shale revolution could be vulnerable to regulatory overkill. This is of particular importance to me, because I

believe we're dangerously close to a point now where entire communities believe that it both isn't safe and can't be made safe. My sense when I worked at America's Natural Gas Alliance (ANGA)—and it hasn't abated any since that time—is that our national debate about fracking has been dangerously close to a fact-free debate. And we're seeing the consequences of that today. Municipalities around the country are seeking to ban fracking and natural gas development within their borders. Some states are putting years-long moratoria on fracking. The great state of Vermont has essentially banned fracking—a particularly courageous act when one considers that Vermont produces no natural gas. I think these fear-based, rather than fact-based, reactions argue strongly that any effort to encourage the adoption by states of the kind of structure that the authors suggest should be accompanied by—or perhaps preceded by—an effort to educate the public about the true risks of fracking, as well as the benefits of natural gas. States, the natural gas industry, power providers, and other stakeholders all have to be involved in that effort. I'm afraid that without it, the public won't be convinced that anything short of a fracking ban will keep their groundwater safe.

The authors also note that regulatory responses to potential fracking risks should be dynamic so that we can best address real risks, rather than perceived risks, as we learn more through experience about what those real risks are. The sad truth of regulatory efforts, in my experience, is that is that they are not typically dynamic, at either the federal or state level. It is understandable—states typically lack the resources to update regulations frequently enough to keep current with changing industries. The rapid growth in shale resources is an example—some states with shale resources that did not previously have a history of oil and gas activity did not have sufficient regulation in place to deal with the shale boom. They have had to play catch up. Nor will many states have the resources to update their regulations to keep pace with advances in technology. One way to bridge the gap, at least temporarily, is by relying on voluntary industry best practices to help fill the gaps. Such programs can typically be adopted more quickly than

regulations can, which means results can come sooner. But I also recognize the public's skepticism about using such efforts as compared to legally binding laws and regulations. And, of course, such programs can't be used to develop the liability regimes necessary to the authors' proposals. It is certainly not a perfect solution and I know how suspicious some will be at using voluntary programs to supplement regulatory ones, unless and until they have a better understanding of the genuine risks of fracking and how industry best practices can ameliorate those risks.

I think the authors' suggestion that the regulatory locus should be at the state level is key to ensuring that we can move forward on adopting such programs. Any effort to make EPA the lead regulator of fracking and shale gas development is doomed to fail. It would require statutory changes that simply aren't possible with the current state of politics surrounding federal environmental regulation. And those politics are not going to change in the foreseeable future. In addition, the argument that states are better situated to regulate the industry is well taken, in my view. To cite the rationale that is most typically given in support of that argument, differences in geology among states with shale resources suggest that a uniform federal regulation is not the best way to proceed.

I think the authors are right again when they observe that the shale revolution could be at risk from regulatory overkill. The industry's moves away from dry gas to liquids, from gas to oil, and the reduction in rig counts and other industry trends all show that the industry is particularly sensitive to cost issues. With gas substantially below \$3 per million BTUs, that sensitivity to costs—including regulatory costs—will continue. Excessive regulation will almost certainly dampen gas development, and/or push gas production away from areas with more burdensome regulations and into areas that have less protective environmental regimes, another outcome we want to avoid.

I especially endorse the authors' suggestion that disclosure should play an important, albeit secondary role, in this proposed structure. Disclosure can go a long way to help address the skepticism that so many feel about the industry—it is an important part of the education component that I feel is so necessary. I take some of my lessons on disclosure from the success we had during the Clinton Administration in expanding the federal Toxic Release Inventory (TRI) program. TRI educates individuals and communities, and allows them to work successfully—sometimes with industry, and sometimes against it—to achieve reductions in toxic pollutants. Given that one important voluntary reporting tool already exists for the natural gas industry—FracFocus¹—and many states

have or are adopting their own disclosure programs, there is every reason to ensure these programs become universal.

I similarly endorse the authors' preference for ex ante regulation where the risks are not novel or heterogeneous. It is an axiom of environmental policy that pollution prevention is cheaper, and usually easier, than remediation.

I will close with an observation about the politics that I think will surround any effort to adopt such regulatory and liability regimes. To put it mildly, it will not be easy. The industry as a whole will certainly fight it, especially proposals that impose strict liability. I think it is likely that some environmental groups will suggest it doesn't go far enough. The industry will say that sufficient programs are already in place and that additional regulation would risk crippling it. I think many of them also genuinely believe that no additional regulation is necessary because the risk simply does not justify it.

When I first started working for ANGA, it was in the early days of efforts to require disclosure of the contents of fracking fluid. As I observed and was involved in internal discussions among industry participants, it became clear to me that my thinking about disclosure was very different than theirs. I saw disclosure requirements as ultimately helpful to the industry, probably even necessary to its survival. I also saw disclosure requirements as inevitable; they were the headlight of a train that was bearing down on the industry. I hoped that they would get aboard that train and try to shape them. But at that early time, many of them dismissed the need for disclosure, saying, "It is impossible for a properly constructed well to contaminate groundwater. The amount of toxic constituents in fracking fluids is incredibly small as compared to the total volume of fluid injected. We have to disclose the contents to medical staff if there is any human exposure. There really is not anything for the public to worry about, so why should we have to take on the burden of additional disclosure?" They thought that a properly educated public would understand that there was no risk, and therefore disclosure wasn't necessary. To be fair, the industry ultimately did get on board with disclosure. I strongly suspect that the same attitude will prevail with any additional effort to regulate their operations. It suggests that we have a lot of hard work ahead of us to create an atmosphere where regulatory bodies, the industry, and the public can come together to create thoughtful and successful regulatory and liability regimes, which will help ensure that we have a robust oil and gas industry for the foreseeable future.

1. See FRACFOCUS CHEMICAL DISCLOSURE REGISTRY, <http://fracfocus.org> (last visited June 12, 2013).

ARTICLE

A Market Approach to Regulating the Energy Revolution: Assurance Bonds, Insurance, and the Certain and Uncertain Risks of Hydraulic Fracturing

by David A. Dana and Hannah J. Wiseman

David A. Dana is the Kirkland & Ellis Professor of Law, Northwestern University Law School. Hannah J. Wiseman is the Attorneys' Title Professor, Florida State University College of Law.

In the industrial revolution of the nineteenth century, the United States was transformed from a largely agrarian nation of farmers to a major center of manufacturing. With industrialization came new risks to public welfare and, ultimately, changes in law to address those. The United States is now undergoing another revolution, an energy revolution that has the potential to transform the United States from a net energy importer into the next Saudi Arabia.¹ Like the industrial revolution, this energy revolution entails new risks and, by necessity, will produce new legal responses to those risks. It has fomented one of the greatest environmental regulatory challenges of our time, and calls for an effective solution that must be rapidly implemented. This Article addresses a set of important legal responses that so far have received scant attention from academic commentators and lawmakers—market-based requirements for enhanced bonding and, more importantly, environmental liability insurance for wells.

The key to the current energy revolution is innovation in the techniques that allow extraction of natural gas from underground rock formations. Advances in horizontal drilling and hydraulic fracturing (or “fracking”) have opened up massive natural gas deposits in several regions of the

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1. INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2012: EXECUTIVE SUMMARY 1 (2012), available at <http://www.worldenergyoutlook.org/publications/weo-2012/>.

United States.² These technologies have driven this revolution by enabling unconventional well development—the production of oil and gas from formations once deemed inaccessible—which we describe as “unconventional development” or “unconventional oil and gas.”³ Unconventional development has begun, and will continue, to change the landscape of this country. Wells already dot the surface of many counties,⁴ and this is only the beginning. This development will continue, with tremendous intensity, very likely for several decades at a minimum.

Just as the industrial revolution gave rise to new risks, such as risks from industrial air pollution and factory fires, unconventional development has generated new risks to public welfare. These risks are not, individually, as massive as those seen in the industrial revolution; public perceptions and environmental protections have changed. But cumulatively, they are likely to be substantial. Some of these risks are relatively certain: we know from past

2. See *Shale Gas Production*, U.S. ENERGY INFO. ADMIN. (Aug. 1, 2013), http://www.eia.gov/dnav/ng/ng_prod_shalegas_s1_a.htm.

3. We focus on unconventional wells because, first, unconventional wells pose more risks by adding more stages to the well-development process. Although horizontal drilling of unconventional wells might cause some risks to decline by lowering the surface footprint, on net the risks might be higher. See Hannah J. Wiseman, *Risk and Response in Fracturing Policy*, 84 U. COLO. L. REV. 729 (2013) [hereinafter Wiseman, *Risk and Response*]. Second, unconventional well development will be the most common form of well development in the United States moving forward. See U.S. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, ANNUAL ENERGY OUTLOOK 2013 WITH PROJECTIONS TO 2040 76-79 (2013), available at [http://www.eia.gov/forecasts/aeo/pdf/0383\(2013\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf).

4. For example, in Fort Worth, Texas, alone there are 2,095 producing wells with 32 permitted. See *Applications and Permits*, CITY OF FORT WORTH, <http://fortworthtexas.gov/gaswells/default.aspx?id=50608> (last visited Mar. 12, 2015). Well numbers have also rapidly expanded in Pennsylvania, Colorado, North Dakota (shale oil), and other states. See Wiseman, *Risk and Response*, *supra* note 3, at 735-36.

experiences with drilling and mining that there is a large risk that certain well operators will simply abandon wells when they are no longer productive and will not make the investments necessary to ensure that the wells are safely closed and sites adequately restored so as to avoid producing pollution.⁵ While the rates of abandonment will likely be lower than in the past due to improved state well plugging regulations, constraints on state enforcement of regulations⁶ and the sheer number of new wells being developed suggest that abandonment still will occur, as will, perhaps more commonly, inadequate site restoration and cleanup. There is also the relatively near-term risk that while the wells and their associated disposal facilities are operating, there will be major accidents and associated pollutant releases. And then there is the long-term risk, a highly uncertain risk—often referred to as “the long-tail risk”—that once all the unconventional development is done, we will discover that this activity degraded the environment and endangered public health in ways that cannot be linked to specific, identified accidents at active well operations.

While commentators have addressed the question of who should address fracking and other unconventional well development risks,⁷ they have paid less attention to how these risks should be addressed. By and large, scholars have assumed that the way to address these risks is prescriptive, “command-and-control” public regulations that establish specific requirements that drilling operators must follow or technologies they must implement.⁸ More recently, it has been suggested that state tort law can fill any holes left by command-and-control regulations by incentivizing operators to follow certain practices or risk penalties in court.⁹ What has been missing from the academic literature, and largely the political debate, is a discussion of a market approach to addressing the known and unknown risks from unconventional development.

In market approaches to addressing risks, the sources of risks face financial incentives to mitigate the risks that are subject to their control. Assurance bonds are one kind of market mechanism whereby the operator of a facility

is required to post upfront funds or other proof of committed financial resources, which the bondholder can return to the operator once it provides assurance that it closed the facility in a safe way. The incentive to recover the bond motivates, at least in part, responsible conduct. Mandatory insurance is another market mechanism, and generally a more effective one, especially for longer term risks. Insurance provides a mechanism for reducing risk to the extent insurance premiums are set to reward behavior that creates less risk and penalize behavior that creates more risk.

These two market approaches, assurance bonds and mandatory insurance, have important advantages over other responses to risk. First, precisely because the risks from emerging or new industries are not well understood,¹⁰ policymakers cannot easily formulate command-and-control regulations that assure a reasonable level of safety. Market approaches tap into industry’s own understandings of the risks associated with its behaviors, and incentivize another actor, insurers, to generate more information about which behaviors are more or less risky. Market approaches are thus information-generating—and in a much more meaningful and comprehensive way than, for example, information-forcing regulations.¹¹ And information generation is key in unconventional oil and gas, where several of the risks are not well understood, but barring the industry until the risks are well understood seems to be too costly. Market mechanisms offer an appealing, pragmatic alternative that sits between the precautionary approach, in which no practice should be undertaken until it is well known to be safe,¹² and the laissez-faire approach, which allows economic activity to continue until it is shown to be unsafe.

Second, assurance bonds and mandatory insurance, even when they do nothing to alter the conduct of industry actors, generate a pool of money that can be used for the remediation of the environmental harms that the actors knowingly or (more often) unknowingly created. Reserving this pool of money¹³ is critical because, absent such funds,

5. See, e.g., R.R. COMM’N OF TEX., OIL FIELD CLEANUP: STATE WELL PLUGGINGS REMAINING BY DISTRICT (PUBLIC) (Mar. 31, 2013), available at http://www.frc.state.tx.us/environmental/plugging/Wells_Remaining_0313.pdf; BUREAU OF OIL & GAS MGMT., PA. DEPT’ OF ENVTL. PROT., PENNSYLVANIA’S PLAN FOR ADDRESSING PROBLEM AND ABANDONED WELLS AND ORPHANED WELLS 4 (2000), available at <http://www.elibrary.dep.state.pa.us/dsweb/Get/Version-48262/>.

6. See, e.g., Hannah J. Wiseman, *State Regulation: Regulatory Risks in Tight Oil and Gas Development*, NAT. GAS & ELECTRICITY, Dec. 2012, at 6.

7. See, e.g., Michael Burger, *Fracking and Federalism Choice*, 161 U. PA. L. REV. PENNUMBRA 150, 163 (2013); Elizabeth Burleson, *Climate Change and Natural Gas Dynamic Governance*, 63 CASE W. RES. L. REV. 1217, 1277 (2013).

8. See, e.g., Wiseman, *Risk and Response*, *supra* note 3.

9. See generally Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98 MINN. L. REV. 145 (2013).

10. Some of the risks of gas and oil development enabled by fracturing—and of fracturing—itsself are well understood, but others are not. See *id.* at 217-22; U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-12-732, OIL AND GAS: INFORMATION ON SHALE RESOURCES, DEVELOPMENT, AND ENVIRONMENTAL AND PUBLIC HEALTH RISKS 4 (2012), available at <http://www.gao.gov/assets/650/647791.pdf>.

11. See, e.g., Keith B. Hall, *Hydraulic Fracturing: Trade Secrets and the Mandatory Disclosure of Fracturing Water Composition*, 49 IDAHO L. REV. 399, 405-09 (2013).

12. For definitions of the precautionary approach, see Jonathan B. Wiener, *Whose Precaution After All? A Comment on the Comparison and Evolution of Risk Management Systems*, 13 DUKE J. COMP. & INT’L L. 207, 210 n.11 (2003).

13. Insurance and assurance bonds require parties to produce different types of information in order to tap money from the pool. For bonds, the pool is more accessible. State agencies typically presume that the bond money will be available for cleanup unless oil and gas operators demonstrate that they have adequately restored sites and plugged wells. For insurance, in the scheme we envision, money would not go to a general cleanup fund. Rather,

there is a high likelihood that operators or public actors will never undertake environmental remediation. Abandoned wells and mines are commonplace, and “orphan” contaminated industrial waste can be found in virtually every city. Even where such sites pose environmental and health risks, no action often is what we observe. In theory, after well development is done and the damage is apparent, policymakers could reallocate public funds from other uses to address that damage. But history (as well as theories of political economy) tells us that the political process usually does not work that way, and hence if there is not a source of remediation funds other than tax revenue, remediation will not occur, especially in the poorer and less politically powerful localities.¹⁴

Improved assurance bonds and mandatory insurance thus should be a central part of the response to the risks posed by unconventional wells on a massive scale but are currently inadequate. Certain states and localities require bonds,¹⁵ although not bonds especially for fracking or environmental remediation (as opposed to drilling generally); the bonds that are required vary substantially and are not nearly high enough. Mandatory insurance for modest coverage is required in a few localities¹⁶ but in only two states that we are aware of,¹⁷ and no state has attempted to establish insurance pooling for areas with unconventional well development, which, as we explain, will need to be a key component of effective mandatory insurance. This Article aspires to shift attention to the pressing need for federal, state, and local governments to move forward with market mechanisms as part of their overall response to unconventional development.

parties demanding insurance funds would have to show that the insured caused contamination, but unlike in tort cases, plaintiffs and plaintiffs’ attorneys will see more payoff in lawsuits because insurance funds will be available, and the causation standard is different. *See, e.g., Tom Baker, Liability Insurance as Tort Regulation: Six Ways That Liability Insurance Shapes Tort Law in Action*, 12 CONN. INS. L.J. 1, 4 (2005); Kent D. Syverud, *On the Demand for Liability Insurance*, 72 TEX. L. REV. 1629, 1634 (1994).

14. *See* David A. Dana, *State Brownfields Programs as Laboratories of Democracy?*, 14 N.Y.U. ENVTL. L.J. 86, 103 (2005); Kirsten H. Engel, *Brownfield Initiatives and Environmental Justice: Second-Class Cleanups or Market-Based Equity?*, 13 J. NAT. RESOURCES & ENVTL. L. 317, 319 (1997-1998).
15. *See, e.g.,* CAL. PUB. RES. CODE §3205.2 (West 2001) (requiring an indemnity bond of \$100,000 per oil and gas waste disposal well); IND. CODE ANN. 14-37-6-1 (LexisNexis 2003) (requiring a bond of \$2,500 per oil and gas well in addition to an annual fee); OHIO ADMIN. CODE 1501: 9-1-03 (2004) (requiring a bond of \$5,000 for a single well); TENN. CODE ANN. §60-1-202(a)(4)(R) (West 2001 & Supp. 2013) (giving the state regulatory board the power to require a bond of up to \$15,000 per well site).
16. *See, e.g.,* ARLINGTON, TEX. CODE OF ORDINANCES No. 11-068, art. VI, §6.01(C)(4)(a) (2011), available at <http://www.arlington-tx.gov/cityattorney/wp-content/uploads/sites/15/2014/05/GasDrilling-Chapter.pdf> (requiring energy companies to carry environmental pollution liability insurance that will cover \$5 million per incident); FARMINGTON, N.M. CODE OF ORDINANCES §19-2-102(a) (2006), available at <http://library.municode.com/index.aspx?clientId=10760> (same); FORT WORTH, TEX., ORDINANCES ch. 15, art. II, §15-41(C)(4)(a) (2009), available at http://www.fortworthgov.org/uploadedFiles/Gas_Wells/090120_gas_drilling_final.pdf (same).
17. Maryland, which does not yet allow hydraulic fracturing, requires environmental pollution liability coverage. *See* MD. CODE ANN., ENVIR. §14-111 (West 2013). Illinois requires “proof of insurance to cover injuries, damages, or loss related to pollution or diminution in the amount of at least \$5,000,000.” 225 ILL. COMP. STAT. 732/1-35(a)(3) (2013).

I. Well Contamination Over Time

Oil and gas wells pose both long- and short-term risks because of the time horizon on which they operate. After an initial period of intense industrial activity, wells may remain in a production stage for 25, 50, or even 100 years, depending on the abundance of oil and gas. Estimates vary and will likely change as more production numbers are available, but some suggest that the average shale gas well produces for 30 years or more.¹⁸ When production tails off during this period, operators sometimes refracture the well, use other enhanced recovery techniques, or abandon it. Abandonment of a well triggers another stage of potential pollution. Nearly all states require operators to plug wells—to remove some of the casing and pour cement into the well and seal it off.¹⁹ This is supposed to prevent any lingering oil or gas from traveling into nearby groundwater and groundwater from entering the well. Thousands of wells are improperly plugged or not plugged at all,²⁰ however, and even properly plugged wells can leak over time.²¹

These and other incidents create a challenging long-term contamination problem. If we assumed an average well life of 30 years, and that 11,400 new gas wells were fractured in 2014 (ignoring the many oil wells that were also fractured), in 2044 alone at least 11,000 gas wells will be plugged—if we assume solvent, responsible operators—and abandoned. And this estimate is unreasonably low; in addition to the 2014 newly fractured wells that operators might abandon in 2044, a portion of this country’s more than 500,000 existing gas wells also will be abandoned that year, while others will still be active, causing their own types of pollution. Further, operators will drill new wells in 2044, contributing to a continuing cycle of potential contamination from newly drilled, active, and abandoned wells.

II. The Case for Mandatory Insurance

Bonds and mandatory insurance bring some of the comparative advantages of market-based approaches to regulatory risks into the current regime. These market-based approaches, which are not currently widely deployed aside from basic bonding requirements, can improve allocative efficiency by forcing internalization of the social costs of oil and gas development, and they can reduce the social

18. Kathy Shirely, *Tax Break Rekindled Interest: Shale Gas Exciting Again*, EXPLORER, Mar. 2001, available at http://www.aapg.org/explorer/2001/03mar/gas_shales.cfm; NAT’L PARK SERV., U.S. DEP’T OF THE INTERIOR, DEVELOPMENT OF THE NATURAL GAS RESOURCES IN THE MARCELLUS SHALE 6 (2009), available at <http://www.marcellus.psu.edu/resources/PDFs/marcellusshalereport09.pdf>.
19. *See* NATHAN RICHARDSON ET AL., THE STATE OF STATE SHALE GAS REGULATION 67 (2013), available at http://www.iff.org/rff/documents/RFF-Rpt-StateofStateRegs_Report.pdf.
20. *See* Dan Frosch, *Wyoming May Act to Plug Abandoned Wells as Natural Gas Boom Ends*, N.Y. TIMES (Dec. 24, 2013), http://www.nytimes.com/2013/12/25/us/state-may-act-to-plug-abandoned-wyoming-wells-as-natural-gas-boom-ends.html?_r=0.
21. *See, e.g.,* BUREAU OF OIL & GAS MGMT., PA. DEP’T OF ENVTL. PROT., STRAY NATURAL GAS MIGRATION ASSOCIATED WITH OIL AND GAS WELLS 1 (2009), http://www.dep.state.pa.us/dep/subject/advoun/oil_gas/2009/Stray%20Gas%20Migration%20Cases.pdf.

costs of development by providing incentives for ongoing risk mitigation.

In regimes (like the current oil and gas regime) characterized by non-redundant regulatory enforcement, where the sole regulators (for oil and gas, primarily state regulators) are constrained by possible “capture” and insufficient enforcement resources, insurance can help fill in the monitoring and enforcement gap by bringing to bear another regulatory force—private insurance companies. These entities cannot be captured in the way legislators or agencies can be, and they are not constrained by the pathologies of the budgetary appropriations processes.

Bonds and insurance, if mandatory, also will be essential to an effective liability regime for unconventional development, especially as to longer-term risks, because bonds and insurance can mitigate what we call the “insolvent defendant” problem and the “clouded causation” problem. Plaintiffs can only collect tort judgments from solvent, viable, ongoing entities. Thus, a corporation, corporate subsidiary, or limited liability company will radically discount expected costs from liability that plaintiffs might seek to impose after the expected “life” of the corporation, corporate subsidiary, or LLC.²² Even if the entity anticipates operating over the very long term, it can effectively cap its liability by limiting its capitalization, even if its owner/shareholders hold massive amounts of capital.²³

There is also the “clouded causation” problem: common law tort liability requires that the plaintiff prove by a preponderance of the evidence that a given defendant specifically caused the harms. Where there are multiple possible causes for contamination, however, as where there is a cluster of potentially contaminating operations in a single area, or where a single operation has received waste or other potentially harmful materials from multiple actors, attributing specific harms to specific defendants and proving actual and “proximate” causation can be an uphill battle and certainly very expensive. Because the passage of time tends to correlate with the loss of direct evidence of what occurred and with the mixing and merging of pollutants from different sources, the clouded causation problem is particularly likely to impede liability with respect to claims brought many years after a defendant ceases operations. Although parties still must demonstrate underlying tort liability to trigger liability insurance, parties will be more likely to file tort claims—even for cases with difficult causation questions—if they know that a pool of money is available. Further, a finding of tort liability is not necessary to use assurance bonds for contamination cleanup long after the site was contaminated.

A well-designed mandatory insurance regime can help reduce the risks and hence harms associated with a risk-laden and not fully understood activity like unconventional development in two distinct ways. First, horizontal drill-

ing and fracking have inherent features—proximity to aquifers, use of huge amounts of water, and production of wastewater, among many others—that entail at least some non-reducible liability risk. Moreover, unconventional development in some areas (such as near major population centers, ecologically sensitive areas, or areas with more vulnerable groundwater supplies) is likely to involve more non-reducible risk than development in other areas. Mandatory insurance, to the extent it is able to price in such irreducible or inherent risk, will not change how unconventional development is done, but it may change how much of it is done and where it is done.²⁴

That is a good thing, because from an allocative efficiency perspective, unconventional development that does not internalize even irreducible risks is likely to be overdone—to have too many resources devoted to it. Absent insurance, too much unconventional development is likely to occur in areas where the risks are greatest (again, highly populated and ecologically sensitive regions) and comparatively too little in areas where risks are lower. Both the net amount and distribution of this development would be changed—and made closer to the socially optimal level—if the development absorbed irreducible risks via insurance premium payments. For example, one consequence of an insurance requirement could be relatively less horizontal drilling and fracking in regions where exposures to major population centers are particularly high.²⁵

This point is relevant to the debate about unconventional development’s effect on the market for investment in energy efficiency technologies and renewable energy like solar and wind.²⁶ These energy (and energy use reduction) sources do not carry anything like the irreducible environmental risk and potential liability unconventional development does.²⁷ And to the extent that is true, absent mandatory insurance, the status quo, at least at the margin, will overproduce investment in new unconventional oil and gas relative to other fundamentally less risky forms of energy production.

Second, some of the risk associated with unconventional development at any site is not irreducible but rather *can* be mitigated and minimized through good safety practices. Command-and-control regulation may not produce regulations that mandate these practices, even putting aside issues of capture and inadequate enforcement appropriations, because it is too slow and inflexible, almost necessarily, and not fully informed by what industry knows or could know and share with the public. Private insurers have a strong incentive to encourage insureds to go beyond what

22. See Wendy E. Wagner, *Choosing Ignorance in the Manufacture of Toxic Products*, 82 CORNELL L. REV. 773, 811, n.143 (1997).

23. For a sophisticated model of how corporations might evaluate the costs and benefits of judgment-proofing strategies, see Richard R.W. Brooks, *Liability and Organizational Choice*, 45 J.L. & ECON. 91 (2002).

24. Insurance will be more readily available in those “specific geographic regions” where unconventional development appears to pose lower risks. WILLIS LTD., WILLIS ENERGY MARKET REVIEW 2012: ALL FRACKED UP? 29 (2012), available at http://www.willis.com/Documents/publications/Industries/Energy/10396_EMR%202012_Complete.pdf.

25. See Hannah Wiseman, *Urban Energy*, 40 FORDHAM URB. L.J. 1793, 1811 (2013).

26. Cf. Henry D. Jacoby et al., *The Influence of Shale Gas on U.S. Energy and Environmental Policy*, 1 ECON. ENERGY & ENVTL. POL’Y 37, 50 (2012).

27. See Garrick B. Pursley & Hannah J. Wiseman, *Local Energy*, 60 EMORY L.J. 877, 895 (2011).

command-and-control regulations require, at least where there is no strong regulatory compliance defense uniformly recognized, because insurers are economically better off if they can take actions that reduce the liabilities they are responsible to cover for any given policy period.²⁸ Insurers also have an incentive to gather information regarding safety that will be relevant to setting the next premium. Moreover, an insured in a regime where an entity can only operate with insurance has a strong incentive to cooperate in producing information lest they be denied coverage. “Insurers” are thus “strategically well placed to gather information and engage in risk management, and reflect these costs through premium differentiation.”²⁹

At the same time, insureds have an incentive to gather information and implement practices that make their operations safer than what command-and-control regulations mandate because they can then use this information and practices as a basis for arguing for a rebate or reduction in premiums for the next policy period. For example, as Haitao Yin, Howard Kunreuther, and Matthew White document, there was a dramatic decline in leaks from underground fuel tanks in certain states when those states required gas stations to carry private cleanup and liability insurance.³⁰ They explain that “the price structure for market-based insurance gives tank owners economic incentives to invest in equipment that reduces the chance of accidental fuel tank leaks.”³¹ In sum, mandatory insurance aligns the incentives of both insured and insurers in favor of learning about safety and trying to improve safety in the insured’s operations.

More directly to the point of the unconventional development context, insurers have proven substantially effective as a force for ex ante market-based regulation in the hazardous waste industry, where “environmental liability insurers require, or offer significant premium discounts for, compliance with private environmental safety codes that are managed and audited by third parties and that are stricter than governmental environmental regulation.”³² Unlike safety codes derived from state regulations or formulated by industry itself, which may reflect industry interests in near-term cost containment at the expense of safety considerations, codes created by insurers acting in collaboration with industry and environmental NGOs are likely to represent what Merrill and Schizer called “best practices” and to come close to reducing that element of risk which is truly reducible with feasible safety measures.³³

Moreover, environmental liability insurers outside oil and gas offer discounts for firms that implement environmental

management systems that help detect and address possible risks and that also cumulatively generate firm knowledge as to actual conditions on the ground and possible means of operational improvement.³⁴ In the fracturing context, well operators could potentially receive insurance discounts for installing electronic monitors and other devices to demonstrate a lack of pollution at their sites. And environmental liability insurers can become involved even prospectively in project planning by insureds, in the interest of managing risk: “Major environmental insurance providers now often include environmental engineering support, serving to improve project supervision and review project data and willingness to monitor for risky activities relevant to underwriting decisions.”³⁵ An environmental management system designed to achieve a strict insurer-approved code, and combined with internal firm auditing and external third-party auditing, may provide a far superior form of ex ante regulation of unconventional development than the current motley and often unrigorous mix of state regulations that are enforced, to the extent they are, by infrequent inspection by an overworked and possibly insufficiently independent corps of state inspectors.

Insurers not only may supplement state-based command-and-control regulation, but also improve it in several ways. First, to the extent that environmental liability insurers will operate in multiple states and multiple unconventional oil and gas regions, as it is reasonable to assume they would, they will have an opportunity and need to see how well state regulatory practices operate across the country. They could identify those regulations and practices that work best and those that are unhelpful, and can serve as a force in disseminating that knowledge not just to industry but also to state regulators in the states where unconventional development occurs. Insurers thus can form a kind of national coordinating mechanism, picking and choosing among the best state approaches and publicizing them, in the way that democratic experimentalism scholars have advocated the federal government should do in areas dominated by state regulations.³⁶ The federal government could take on this coordinating role, but unlike insurers, it lacks a profit-based reason to do so, and has not consistently acted as a coordinator as a general matter. And in unconventional development, federal regulators at EPA appear hesitant to do anything that might antagonize state regulators or industry.³⁷ Finally, it bears noting that redundancy can be a good thing: both insurers and the federal government could act to coordinate state experiments in the interest of promoting a better, safer national approach.

28. See Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197, 203-05 (2012).

29. BENJAMIN J. RICHARDSON, ENVIRONMENTAL REGULATION THROUGH FINANCIAL ORGANISATIONS 363 (2002).

30. Haitao Yin et al., *Does Private Insurance Reduce Environmental Accidents?*, REGULATION, Summer 2012, at 36, available at http://opim.wharton.upenn.edu/risk/library/J2012Summer_Regulation_HY-HK-MW_EnvironmentalInsurance.pdf.

31. *Id.* at 37.

32. Ben-Shahar & Logue, *supra* note 28, at 211.

33. See WILLIS LTD., *supra* note 24 at 5.

34. Benjamin J. Richardson, *Mandating Environmental Liability Insurance*, 12 DUKE ENVTL. L. & POL’Y F. 293, 315-16 (2002).

35. *Id.* at 315; see also DAVID J. DYBDAHL, AM. RISK MGMT. NETWORK, A USER’S GUIDE TO ENVIRONMENTAL INSURANCE 12.

36. See Michael C. Dorf & Charles F. Sabel, *A Constitution of Democratic Experimentalism*, 98 COLUM. L. REV. 267, 340-56 (1998).

37. See Draft Research Report: Investigation of Ground Water Contamination Near Pavillion, Wyoming, 78 Fed. Reg. 55694 (Sept. 11, 2013) (publishing an EPA report transferring authority to Wyoming to continue investigation of potential groundwater contamination from fracturing).

It is also realistic to think that the availability and adequacy of insurance affects lawyers, judges, and even legislators when they make decisions regarding the imposition of liability. Lawsuits based on accidents at unconventional wells or gradual seepage will not be easy cases to win, and they will not be inexpensive cases to litigate.³⁸ The plaintiffs' lawyers and government lawyers who consider bringing such cases will only want to do so if there is a reasonable possibility of recovery, and if the defendants are insolvent and lack insurance, there will be no rational reason to proceed with litigation and no reason to invest in testing the contours of liability.³⁹

Judges, too, may be affected by the availability of insurance. In cases involving unconventional oil and gas-related harms where there are allegedly multiple contributing industry entities but only one or a few that have insurance or can otherwise cover liabilities, considerations of fairness and proportionality may dissuade courts from finding joint and several liability. Courts also might be unlikely to apportion liability based on some proxy, such as the amount of production of gas or oil or years of active drilling of each of the entities involved in the geographic area at question. But if all of the entities, even insolvent ones, have insurance, and courts could hold them financially responsible *ex post* with insurance proceeds, courts may be more likely to find liability for harms where a number of unconventional well operations were underway in a concentrated space (which describes many unconventional oil and gas settings).⁴⁰

If this analysis is correct, then mandatory insurance is important not just to ensure that whatever liability is imposed is satisfied in the form of recovered judgments. Mandatory insurance will affect the amount of liability that is imposed—that is, it will lead to, on the margin, more suits and more and larger judgments or settlements made in light of anticipated judgments. Realizing this, the actors in the unconventional oil and gas industry *ex ante* may anticipate more liability, and so too will their insurers. This will mean higher premiums to account for the higher risks of liability but also even greater measures to try to mitigate risk through effective safety practices on the ground. The ambiguity as to the exact contours of liability at any time will translate into what Kunreuther and other

scholars have called an ambiguity premium, a premium that reflects insurers' ambiguity aversion, and as long as insurers may charge for such ambiguity, the co-evolution of the liability and insurance regimes is feasible.⁴¹

The objection that it is impossible to insure a new, highly risky activity for which the risks are not fully known is an old one, and has been disproven in the offshore oil drilling context. And to the extent that insurers lack risk information to set adequate premiums, they will likely gather this data from industry, providing a useful cross-well comparison that individual plaintiffs—and even regulators, with whom industry is reluctant to share risks—are unlikely to see. If this information is still not enough, states have begun to require industry testing and disclosure of pollution at sites,⁴² thus providing further information on risks to a potentially reluctant insurance industry. Furthermore, to the extent that an insurance mandate would push the industry toward larger, highly capitalized operators, if we think that including small operators in this business is important, these operators could pool their resources to purchase insurance. And we have not proposed to allow large operators to self-insure—a policy that would indeed slant the industry toward certain types of firms. Self-insurance removes the objective third-party assessment and monitoring of risk that is essential to the regime proposed here.

Finally, we note that the bonding and insurance requirements that we propose here must have detailed measures to ensure adequate risk protections. They must be site-specific and apply to each party that owns the mineral interests or associated facilities, thus requiring state supervision to ensure that insurance coverage continues along with changes in ownership. States, or insurance companies, must also review operators' financial integrity prior to the purchase of insurance to guarantee that the companies will be able to pay relatively large deductibles. Bonds provided by industry to ensure proper well plugging and abandonment also must cover all potential costs, and must be stringently enforced.

Insurance and bonding strategies alone will not address all of the risks of unconventional development, but they could achieve substantial progress in this area.

38. SMITA WALAVALKAR, CTR. FOR CLIMATE CHANGE LAW, COLUMBIA LAW SCH., DIGEST OF HYDRAULIC FRACTURING CASES (2013), available at http://www.law.columbia.edu/null/download?&exclusive=filemgr.download&file_id=622373.

39. See, e.g., Stephen G. Gilles, *The Judgment-Proof Society*, 63 WASH. & LEE L. REV. 603, 606 (2006).

40. Insurers could respond to such judicial moves by turning to the state legislatures in order to obtain legislation specifying a traditional, and strict, causation standard for claims based on unconventional drilling. However, it is unclear whether such efforts would result in legislation, and even if they did in some states, they might not in others. Such efforts by insurers would come up against the political opposition of the plaintiffs' bar.

41. See Howard Kunreuther & Robin M. Hogarth, *How Does Ambiguity Affect Insurance Decisions?*, in CONTRIBUTIONS TO INSURANCE ECONOMICS 307, 321 (Georges Dionne ed., 1992); Laure Cabantous et al., *Is Imprecise Knowledge Better Than Conflicting Expertise? Evidence From Insurers' Decisions in the United States*, 42 J. RISK. UNCERTAINTY 211 (2011).

42. See Hannah J. Wiseman, *Hydraulic Fracturing and Information Forcing*, 74 OHIO ST. L.J. FURTHERMORE 86, 92-93 (2012).

C O M M E N T

Options for Regulating the Environmental Impacts of Hydraulic Fracturing

by Leslie Carothers

Leslie Carothers is a Visiting Scholar at the Environmental Law Institute.

The exploitation of shale gas and oil reserves by hydraulic fracturing and horizontal drilling has transformed the U.S. energy industry, bringing desired economic development and greater energy independence for the United States but also new environmental challenges in the states where the resource is abundant. The technique of hydraulic fracturing involves pumping water containing various materials and chemicals into shale formations at high pressure to crack the rock and release the gas and oil contained in it. Combined with horizontal drilling, hydraulic fracturing opens huge shale deposits in the U.S. to production of gas and oil where recovery was not practical before.¹ Environmental law practitioners and academics are devoting significant attention to the demands of representing the actors in the industry and to examining the extent to which the existing environmental regulatory framework for the oil and gas industry is equal to the task of responding to the risks presented by the rapid adoption of a novel technology. The ELI-Vanderbilt Law School Environmental Law and Policy Annual Review identifies outstanding academic work in the field of environmental law. The reviewers selected two excellent articles on the challenges of hydraulic fracturing (fracking for short) to the regulatory system for presentation and discussion at the 2015 program on Capitol Hill: David A. Dana and Hannah J. Wiseman, *A Market Approach to Regulating the Energy Revolution: Assurance Bonds, Insurance, and the Certain and Uncertain Risks of Hydraulic Fracturing*,² and Thomas W. Merrill and David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination*.³ Both articles address many of the common

issues raised about the strengths and weaknesses of the current and potential alternative regulatory approaches, while emphasizing different but not mutually exclusive solutions. This comment will focus primarily on the approaches to setting regulatory standards and securing compliance by the key actors in the cycle of production and site restoration. It concludes with a comment on the problem of cumulative impacts of fracking on landscapes, an issue receiving less attention in the articles, and the importance of maintaining local land use authorities to contend with those impacts.

By way of background, the oil and gas industry has historically been regulated by state agencies, either specialized oil and gas agencies or—more commonly in the eastern gas producing states—by environmental agencies. At the federal level, the Interior Department has a role like the state oil and gas commissions in regulating gas and oil exploration and production on federal lands, Indian reservations, and offshore waters. The Department has recently issued regulations for hydraulic fracturing on federal lands, an action challenged by some representatives of the oil and gas industry on the ground that the agency should defer to the requirements in the states where the federal lands are located.⁴ The Interior Department, like the state agencies, has been subject to criticism that as an agency with the mission both to promote and to regulate energy production, it has been less than alert to new risks, as in the case of the deep ocean oil drilling involved in the Deepwater Horizon spill.⁵ The U.S. Environmental Protection Agency (EPA) is a regulatory agency with no mission to promote energy development, but EPA has limited statutory authority to regulate oil and gas operations. The agency regulates air quality impacts like methane emissions⁶ and underground injection of production wastes. However, other major

1. See ENVTL. LAW INST. AND WASHINGTON & JEFFERSON COLLEGE CTR. FOR ENERGY POLICY & MGMT., *GETTING THE BOOM WITHOUT THE BUST: GUIDING SOUTHWESTERN PENNSYLVANIA THROUGH SHALE GAS DEVELOPMENT* 4 (2014), available at <http://www.eli.org/research-report/getting-boom-without-bust-guiding-southwestern-pennsylvania-through-shale-gas-development> [hereinafter ELI and W&J Report].
2. David A. Dana & Hannah J. Wiseman, *A Market Approach to Regulating the Energy Revolution: Assurance Bonds, Insurance, and the Certain and Uncertain Risks of Hydraulic Fracturing*, 99 IOWA L. REV. 1523 (2014).
3. Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98

MINN. L. REV. 145 (2013).

4. See Carol Davenport, *New Federal Rules Are Set for Fracking*, N.Y. TIMES, Mar. 21, 2015, at A-10. Tradition aside, there appears to be no current legal basis for an objection to the Interior Department's regulation of oil and gas development on federal lands.
5. Dana & Wiseman, *supra* note 2, at 1553.
6. Merrill & Schizer, *supra* note 3, at 169-70.

sources of authority like the Clean Water Act's storm water provisions and the general federal waste regulation laws are expressly inapplicable to the oil and gas industry.⁷ Consequently, neither the Interior Department nor EPA provides federal oversight of state regulation of most oil and gas drilling activities. The focus needs to be on supporting and strengthening state programs by improving best practices and enforcement methods to deal effectively with the explosive growth in shale gas and oil production and the greater risk of water contamination presented by new production technologies. Both articles address these tasks.

The most important elements of an effective regulatory program are setting standards and making them stick through traditional enforcement tools or other methods of ensuring compliance. The challenges encountered in these two areas depend on (1) the production processes and their associated environmental impacts, and (2) the players—what entities are involved and regulated in the processes and what their technical and financial capabilities are. Both articles describe in detail the phases of shale gas production and the environmental risks at each stage. Neither offers a similarly clear picture of the number and size of the businesses involved in each phase. The composition and capacities of the regulated community are major factors in assessing the effectiveness of compliance strategies, including liability regimes and insurance requirements.

In brief, the production process generally involves: (1) site assessment; (2) building the well pad and any roads needed; (3) vertical and horizontal drilling; (4) hydraulic fracturing, including introduction of materials and chemicals to keep the cracks open; (5) withdrawal of waste cuttings and fluids from the well upon completion; (6) waste handling and disposal, principally water; (7) ongoing recovery of gas and oil from successful wells; and (8) closure of wells and site restoration.⁸ The Merrill and Schizer article concludes that managing wastewater from these processes is the most important problem because the amount of water used in hydraulic fracturing is much greater than in conventional oil and gas drilling,⁹ and the wastewater includes contaminants from fracking chemicals as well as material churned up in the drilling process. The authors acknowledge the possibility of fluid or methane migration from shale seams to aquifers. However, they state that studies have found no recorded cases of direct invasion of shallow water zones by fracture fluids during the fracking process.¹⁰ Merrill and Schizer also recognize the risk of leaks from cracked well casings above the water table, though they treat this risk as

one that is common to conventional drilling and not a new problem presented by fracking.¹¹

Dana and Wiseman provide a table of risks at each stage of the fracking process; it shows the impacts on water resources principally from transport and storage of drilling materials on site, waste storage and disposal, and well termination and post-termination activities at the well sites.¹² Both articles suggest that developing and implementing appropriate leak and spill prevention and disposal options for process and wastewaters are high priorities. Substantial work is being done on these issues, including work on methods to minimize the pollutants in the waste stream and to maximize the possibilities for recycling. The states do not lack numerous public and private sources of recommended best practices for water management, as well as other impacts, that can be adopted in setting permitting requirements.¹³

In the writer's opinion, the greater problem may be securing compliance with best practices by the large numbers and diverse capabilities of the many players at various phases of shale gas development. If the primary environmental impacts result from poor site operations and management and not from major equipment problems, good performance is a function of the competence, training, and supervision of the workforce. Achieving this is a management challenge even for very sophisticated and well-funded companies. It is therefore important in designing enforcement programs to know what types of businesses are active in the fracking process. The information on this point in the two articles is at best inconclusive. The well operator is likely to be a substantial company, like Chesapeake Oil or a subsidiary of Shell. However, many operations including drilling and fracturing are contracted out to smaller service companies.¹⁴ Major oil service companies like Hal-

7. *Id.* at 200-01.

8. See Dana & Wiseman, *supra* note 2, at 1535-41, 1544.

9. Merrill & Schizer, *supra* note 3, at 177 (citing an EPA estimate that 2-4 million gallons of water are used per well). Blowouts from well operations do occur, but are rare. Dana & Wiseman, *supra* note 2, at 1537.

10. See Merrill & Schizer, *supra* note 3, at 189-91.

11. *Id.* at 185. However, it should be noted that the new Department of the Interior regulations of fracking operations on federal lands upgrade existing well casing requirements, and the Department specifically rejected the industry assertion that there is no evidence that fracking has caused contamination of groundwater. See Hydraulic Fracturing on Federal and Indian Lands, 80 Fed. Reg. 16128, 16180 (Mar. 26, 2015) (to be codified at 43 C.F.R. pt. 3160) [hereinafter DOI Hydraulic Fracturing Rule].

12. Dana & Wiseman, *supra* note 2, at 1544. Merrill & Schizer also cite an earlier article by Wiseman concluding that the most pressing risks result not from injection of fracking fluids but from other stages in the well development process and the higher rate of drilling activity. Merrill & Schizer, *supra* note 3, at 184 n.189 (citing Hannah J. Wiseman, *Risk and Response in Fracturing Policy*, 84 U. COLO. L. REV. 101 (2013)).

13. These include major industrial associations such as the America Petroleum Institute, regional state and industry organizations, and nonprofit partners working on development of standards for fracking operations. See Merrill & Schizer, *supra* note 3, at 217 n.345, 218 n.348. The Environmental Defense Fund has worked with partners on a program to certify users of good practices. *Id.* at 227.

14. Dana & Wiseman, *supra* note 2, at 1558 n.140 (citing Professor Jennifer Nash, Exec. Dir. Regulatory Policy Program, Harvard Univ. Kennedy Sch., Remarks at the Workshop on Governance of Risks of Unconventional Shale Gas Development National Research Council (Aug. 16, 2013), available at http://sites.nationalacademies.org/xpedito/groups/dbasssite/documents/webpage/dbasse_084368.pdf).

liburton and Schlumberger serve the business, but again, many other companies are entering the field. The new entrants appear to be smaller, not larger companies.¹⁵ A report by the Manhattan Institute estimates that 20,000 small and midsize firms with median employment of 15 are engaged in drilling, extraction and support work, although it is not clear how many are directly engaged in the higher risk activities of fracking.¹⁶ The well operator and permit holder's responsibility for the performance of contractors is an unexamined question.¹⁷ Without a clearer picture of the firms at work in fracking activity, it is at best premature to conclude that solvency will not be a barrier to compliance.¹⁸

Smaller companies are less likely to have the financial resources to assure that the environmental impacts of operation and closure are addressed, especially at multiple well sites, assuming the firms are still in business after potentially decades of well operation.¹⁹ The sheer number of new permits (estimated by EPA at 11,400 new gas wells fractured annually)²⁰ and the number and changing identities of contractors involved present a big problem for regulatory agencies attempting to ensure compliance with standards for all phases of production and well closure. Both authors point out the huge inventory of existing wells and the prevailing underfunding of oil and gas enforcement agencies.²¹

The Dana and Wiseman proposal's use of market mechanisms including assurance bonds or insurance has considerable appeal in a situation where the regulated community is so large and the technical and financial strength appears

likely to be variable among the companies involved. The effectiveness of using assurance bonds in practice is hard to assess; the amounts of bonding required in the examples given do not seem high enough to produce the kind of funding that would be needed to compensate for inadequate closure of wells, for example.²² Assuming these levels have to be set by regulation means that there will be considerable industry pressure to keep them low.

The requirement for insurance could be easier to establish. Indeed, several states have set high dollar insurance requirements, though one of them, Maryland, does not yet allow hydraulic fracturing at all.²³ Insurance requirements could be applied to each company involved in the well development and production process and tailored to the risks in that phase of the operation. From the standpoint of securing compliance with best practices and assuming responsibility for closure at the end of life of a well, the presence of insurance payable to the agency or to anyone harmed by noncompliance would be both an incentive to comply to reduce premium costs and a means to fund corrective action. The Dana and Wiseman article also makes persuasive arguments for the role of insurers in helping to promote development and adoption of best practices as well as providing a source of funds recoverable in tort proceedings that would otherwise not be undertaken against small and medium sized companies.²⁴ They cite the very positive results of instances where insurance requirements have been imposed on underground tank owners and rates of non-compliance have gone down.²⁵ An insurance requirement that has the effect of eliminating weak players from engaging in this activity is also a benefit of this market-based approach.

Another potential advantage of an insurance strategy for hydraulic fracturing is the possibility of adjusting conditions and premiums to heterogeneous and especially higher risk locations for development. Dana and Wiseman point out that the risks of activity "near major population centers, ecologically sensitive areas or areas with more vulnerable groundwater supplies" would be greater and presumably more expensive to insure²⁶; mandatory insurance could thus exert pressure to avoid such locations.²⁷

Experience with hydraulic fracturing in Pennsylvania, where the Marcellus Shale underlies vast areas of populated and forested land, illustrates the greater risk and controversy presented by comparison to development in the wider open spaces of North Dakota or Texas.²⁸ Even an insurance regime cannot deal with the unavoidable landscape impacts presented by multiple wells, gas pipeline gathering systems, and associated roads. The question of cumulative impacts of hundreds of wells in areas previously undeveloped is not easy to address with best practices, strict liabil-

15. Merrill & Schizer, *supra* note 3, at 249-50 n.424 (citing Alison Sider, *Fracking Firms Face New Crop of Competitors*, WALL ST. J., July 9, 2013, at B6). An earlier Wall Street Journal article is cited for the point that larger multinational companies are buying up smaller drillers. It is unclear whether this information is conflicting or whether different phases of the fracking operation and different sets of companies are involved. *Id.* at 250 n.425.
16. MARK P. MILLS, MANHATTAN INST. FOR POLICY RESEARCH, POWER & GROWTH INITIATIVE REPORT NO. 4, WHERE THE JOBS ARE: SMALL BUSINESSES UNLEASH ENERGY EMPLOYMENT BOOM (2014), available at www.manhattan-institute.org/html/pgi_04.htm#_VQ9JPEY8qu4.
17. An example of the tendency of larger players in a chain of development to try to shift compliance responsibilities to others in the chain is mentioned in the Department of the Interior's preamble to its new fracking rules. The Department noted that permitted drill site operators cannot use a contract with a service contractor to escape responsibility for all operations on the permitted site. See DOI Hydraulic Fracturing Rule, *supra* note 11, at 16173. Whether states with regulatory authority take the same position is an important question.
18. Merrill & Schizer, *supra* note 3, at 249-50 (concluding that solvency is less of an issue given the authors' belief that major companies are commanding an increasing share of shale oil and gas production).
19. Dana & Wiseman, *supra* note 2, at 1558. For example, the average reclamation costs for a fracking well in Pennsylvania's Marcellus Shale are estimated at \$100,000. See ELI and W&J Report, *supra* note 1, at 56. It is worth noting that the slowdown in drilling resulting from the dramatic decline in oil prices has caused many companies to exit the business. One fracking service company executive stated that the 61 service companies in the business at the beginning of 2014 had declined to 41 and that the numbers will decline further. David Wethe, *Half of U.S. Fracking Companies Will Be Dead or Sold This Year*, BLOOMBERG NEWS (Apr. 26, 2015, 11:21 AM), <http://www.bloomberg.com/news/articles/2015-04-22/half-of-u-s-fracking-companies-will-be-dead-or-sold-this-year>. It is reasonable to expect that many smaller companies involved in later stages of drill site operations and management are also leaving the business.
20. See Dana & Wiseman, *supra* note 2, at 1541.
21. See *id.* at 1533 n.123 (citing Hannah J. Wiseman, *State Regulation: Regulatory Risks in Tight Oil and Gas Development*, NAT. GAS & ELECTRICITY, Dec. 2012, at 6).

22. *Id.* at 1531, 1562.

23. See ELI and W&J Report, *supra* note 1, at 58.

24. Dana & Wiseman, *supra* note 2, at 1565-67.

25. *Id.* at 1565.

26. *Id.* at 1564.

27. *Id.*

28. See ELI and W&J Report, *supra* note 1, at 14-26.

ity regimes, or insurance requirements. In Pennsylvania, impact fees for municipalities and the restoration by the Pennsylvania Supreme Court of local zoning powers that the legislature had eliminated are, at present, the only tools to deal with intense development in more developed and forested areas.²⁹ A strong start in thinking through

the options for regulating shale gas production has been made as evidenced by the articles discussed in this comment, but there is more legal and policy work to be done to strengthen the tools of local as well as state government in regulating the long term and cumulative impacts and risks of the energy revolution.

29. *Id.* at 79-96 (impact fees), 113-18 (land use authorities).

C O M M E N T

Bond What You Know and Insure What You Don't: A Comment on A Market Approach to Regulating the Energy Revolution

by W. Blaine Early III

W. Blaine Early III is a member of the law firm of Stites & Harbison, PLLC, in the firm's Lexington, Kentucky, office. The opinions expressed in this Comment are his alone and do not represent those of the firm or of any client.

It is a privilege to comment on the extensive and thought-provoking work of Professors Dana and Wiseman. I approach this from the perspective of my practice in the environmental regulation of natural resources industries, including coal and hard rock mining and oil and gas extraction, and the role that surety bonds and other forms of financial assurance play in those industries. Professors Dana and Wiseman describe categories of relatively certain risks in the short or medium term versus those risks that are uncertain and have a long tail. This comment focuses on how surety bonds can address the relatively certain risks of these natural resources industries within the framework of command-and-control regulation, while insurance is better suited for the more uncertain risks.

I. The Risks

Both of the primary papers on this topic in today's Environmental Law and Policy Annual Review detail the risks of environmental harm that hydraulic fracturing may present. Professors Dana and Wiseman included as "certain risks" the well drilling process itself, the active process of hydraulic fracturing, and the handling and disposal of the fracturing fluids and produced water.¹ In a similar treatment, Professors Merrill and Schizer identified risks associated with cracked well casings and blowouts and releases or spills of fluids and produced water.² In June 2015 the U.S.

Environmental Protection Agency (EPA) released a draft review of the impact of hydraulic fracturing on drinking water resources.³ That EPA report focused on five mechanisms in the hydraulic fracturing process that have the potential to contaminate drinking water: water acquisition, mixing of the fracturing fluids at the well pad, well injection, the return of the injected fluid and produced water, and the treatment or disposal of the produced wastewater.⁴ Anecdotal examples can be cited for some environmental contamination from each of these described risks. They are fairly quantifiable and predictable, but may not be common. In fact, EPA concluded that it "did not find evidence that these mechanisms have led to widespread, systemic impacts on drinking water resources in the United States."⁵ In contrast, some potential environmental impacts are far less predictable or quantifiable. These "uncertain risks" include the potential upward migration of fracturing fluids to contaminate drinking water, the movement of methane or sediments to contaminate groundwater, and the exacerbation of seismic activity. The uncertain risks are often the ones that generate most public comment and concern.

Distinguishing between these categories of certain and uncertain risks is important in designing a financial support system to help safeguard environmental quality. For example, the certain risks associated with storage of fracturing fluids, disposal of wastewater, installation and cementing of well casings, and over-

1. David A. Dana & Hannah J. Wiseman, *A Market Approach to Regulating the Energy Revolution: Assurance Bonds, Insurance, and the Certain and Uncertain Risks of Hydraulic Fracturing*, 99 IOWA L. REV. 1523, 1545 (2014).

2. Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98 MINN. L. REV. 145, 182-88 (2013).

3. U.S. ENVTL. PROT. AGENCY, ASSESSMENT OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING FOR OIL AND GAS ON DRINKING WATER RESOURCES, EXTERNAL REVIEW DRAFT (2015), available at <http://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=244651>.

4. *Id.* at ES-6.

5. *Id.* at 10-1.

sight of well injection are within the scope of good site management and engineering practices and are generally within the control of the well operator. Even these certain risks include an uncertain element: intentional misconduct that is contrary to law. The other uncertain risks, however, may be related to large-scale geologic characteristics that are by their nature difficult to assess. Examining these risks in comparison to the requirements of existing regulatory frameworks helps clarify the roles of bonds and insurance.

II. Financial Assurance in Regulatory Programs

The natural resources extractive industries, whether energy or materials-related, are subject to state and federal laws governing environmental performance, land reclamation, and water quality. These laws include the industry-specific programs discussed below, the Clean Water Act (CWA)⁶ related to water quality and wetlands protection, the Clean Air Act (CAA)⁷ related to fugitive and process emissions, and the Resource Conservation and Recovery Act (RCRA)⁸ related to the management of non-mining/beneficiating wastes.⁹ Many of these other environmental protection statutes also require financial assurances for some aspect of their performance standards.¹⁰

A. The Surface Mining Control and Reclamation Act

The surface effects of coal mining and related activities are regulated under the federal Surface Mining Control and Reclamation Act (SMCRA).¹¹ Congress intended SMCRA to “protect society and the environment from the adverse effects of surface coal mining operations”¹² and to “assure that adequate procedures are undertaken to protect the environment.”¹³ Under federal SMCRA each state may assume primary enforcement responsibility under the concept of “primacy,”¹⁴ and most states with coal resources have taken advantage of that opportunity.

6. 33 U.S.C. §§1251-1387 (2012).

7. 42 U.S.C. §§7401-7671 (2012).

8. 42 U.S.C. §§6901-6992k (2012).

9. RCRA does not regulate mineral extraction, beneficiation, and processing wastes under the “Bevill” amendment which excludes them. *See* 42 U.S.C. §6982(f); 40 C.F.R. §261.4(b)(7) (2014).

10. Under RCRA financial assurances for waste treatment, disposal or storage area closure and post closure must be provided. *See* 40 C.F.R. §§264-265 Subpart H, 264.143, 264.145 (2014). Under the CWA, financial assurances can be required to ensure that wetlands mitigation projects are completed. *See* 33 C.F.R. §332.3(n)(1)-(6) (2014). Under the Safe Drinking Water Act, financial assurances are required for underground injection wells. *See* 40 C.F.R. §§144.28(d), 144.52(a)(7), 144.60-144.70 (2014).

11. 30 U.S.C. §§1201-1328 (2014).

12. *Id.* §1202(a).

13. *Id.* §1202(d).

14. *See id.* §1235.

SMCRA generally prohibits coal mining without a permit. The permitting process involves detailed baseline environmental information and approval of operations, environmental performance, and reclamation plans. The reclamation obligations include, but are not limited to, the backfilling of open pits, grading, topsoil replacement, revegetation, removing drainage control facilities, highwall reduction, underground mine sealing, shaft and mine entry sealing, demolition of coal preparation and processing plants and related surface structures, reclamation of refuse and waste rock (spoil) disposal/storage areas, restoring the hydrologic regime and, if necessary, long term water treatment.¹⁵

Prior to receiving its permit, the operator must post adequate financial assurance to provide funds to complete final reclamation in compliance with the law and as detailed in the approved permit if the operator fails to do so.¹⁶ The required amount of financial assurance is to be “sufficient to assure the completion of the reclamation plan if the work has to be performed by the regulatory authority in the event of forfeiture”¹⁷ SMCRA allows financial guarantees to be in the form of a corporate surety bond,¹⁸ cash collateral bond,¹⁹ a self bond,²⁰ or securities.²¹ Most coal companies use corporate surety bonds, but it is not uncommon for a mining company to use a combination of financial assurance instruments.

B. Federal Land Policy and Management Act

The Federal Land Policy and Management Act of 1976 (FLPMA)²² regulates development of hardrock minerals on public lands, but these non-coal mines on federal land are subject to regulation therefore by *both* state and federal agencies under various laws.²³ The U.S. Department of Interior, Bureau of Land Management (BLM) oversees mining on non-forest lands and administers performance and reclamation requirements known as the “3809 Regulations.”²⁴ Before beginning mining, the operator must prepare a plan of operations approved by BLM.²⁵ FLPMA’s reclamation standards include topsoil storage and placement, erosion and control measures, standards for “reshaping” the area disturbed, revegetation and habitat restoration, restoration

15. 30 C.F.R. §§715.10-715.20 (2014).

16. *Id.* §§800.4, 800.12.

17. *Id.* §800.14(b).

18. *Id.* §800.20.

19. *Id.* §800.21.

20. *Id.* §800.23.

21. *Id.* §800.12.

22. 43 U.S.C. §§1701-1787 (2012).

23. For example, in Nevada, in addition to FLPMA mining operations must comply with state mining laws, NEV. REV. STAT. §§519A.010-519A.290 (2014), and implementing regulations, NEV. ADMIN. CODE, §§519A.010-519A.635 (2014).

24. 43 C.F.R. §§3809.1-3809.900 (2014).

25. *See, e.g., id.* §3809.11.

of hydrologic regime, control of water pollution and water treatment, and other site specific requirements contained in the approved plan of operations.²⁶

FLPMA, like SMCRA, requires financial assurance of an amount sufficient for the BLM to pay a third party contractor to complete the reclamation and approved plan of operations if the operator fails to perform.²⁷ The acceptable types of financial assurance include corporate surety bonds, cash, irrevocable letters of credit, certificates of deposit, government securities or bonds, investment grade rated securities or insurance.²⁸

C. Oil and Gas Leases on Federal Lands

As Professors Dana and Wiseman described, the regulation of oil and gas drilling is a patchwork quilt, at best. The regulations applicable to drilling operations on federal lands are instructive for purposes of comparison to the other programs discussed above. The obligations required of a lessee on federal lands include timely plugging of well(s), final reclamation of the lease area, restoring lands or surface waters adversely affected by lease operations, exercising due care to prevent undue damage to surface or subsurface resources, and exercising due diligence to control/remove pollutants.²⁹

These regulations require a bond of an amount sufficient to ensure compliance with these obligations.³⁰ BLM recently promulgated a final rule regarding Oil and Gas, Hydraulic Fracturing on Federal and Indian Lands.³¹ In response to comments on the proposed rule concerning increased bond amounts to account for the additional risks posed by hydraulic fracturing, BLM declined to make a blanket increase. Instead, BLM stated “that it has authority under existing regulations to adjust bond amounts to address any increased liability that may be present as a result of hydraulic fracturing operations.”³²

D. Summary of Financial Assurance

The common feature of the financial assurance required under these typical programs is a focused and task-specific calculation or prediction of the costs necessary to complete the work that is required of the mining or oil and gas operator. What are not generally included in these calculations are unanticipated events that might ultimately result in adverse environmental impacts—that is, the types of uncertain risks discussed above. We will next examine the nature of surety bonds and how they are more suited to the certain rather than uncertain risks.

III. The Nature of Surety Bonds

The surety relationship involves three distinct parties: the Principal (permittee or lessee), who is the primary obligor; the Obligee (Regulatory Agency), which is the party to whom the principal and surety owe a duty; and the Surety (Bonding Company), which is the secondary obligor.³³ It is black-letter law that surety bonds are not insurance.³⁴ The bond, a three-party contractual relationship, is far different from a two-party insurance policy. In *Meyer v. Building & Realty Service Co.*, the court discussed this distinction as follows:

*A contract of surety creates a tripartite relation between the party secured, the principal obligor, and the party secondarily liable This tripartite relationship is always present in a surety contract, while an insurance contract in itself never creates a tripartite relation analogous to the suretyship relation Insurance has been defined as a contract whereby one undertakes to indemnify another against a loss, damage, or liability arising from an unknown or contingent event; whereas a contract of suretyship is one to answer for the debt, default, or miscarriage of another*³⁵

In the natural resources context, the surety stands behind the permittee or lessee with funds necessary to complete the agreed-upon scope of work required by the applicable permit, lease, and law.

Instead of risk-shifting instruments, surety bonds have been described as credit transactions where the “surety bonds . . . are meant to function as credit accommodations in which the surety anticipates no loss.”³⁶ Consistent with the concept of bonds as credit transactions (loans) where the surety expects no loss, a surety has many rights, including the common law rights of indemnity and subrogation. In addition to a surety’s rights under common law, a surety often seeks protection in the form of collateral and a contractual general agreement of indemnity from the bonded principal.³⁷ By holding the principal’s collateral and by asserting its common law and contractual indemnity rights, the surety may exert tremendous influence over a principal to encourage the principal to perform its primary obligation. The surety does not, however, issue the bond in anticipation of some uncertain event that may have far-reaching and unpredictable impacts of unknown cost. That is the proper role of insurance.

26. 43 C.F.R. §3809.420 (2014); see also 30 U.S.C. §1258(a)(13) (2012).

27. See 43 C.F.R. §3809.555 (2014).

28. *Id.*

29. See, e.g., 43 C.F.R. §§3104.1, 3162.5-1 (2014).

30. *Id.*

31. 80 Fed. Reg. 16128 (Mar. 26, 2015) (to be codified at 43 C.F.R. pt. 3160).

32. *Id.* at 16181.

33. THE LAW OF SURETYSHIP §1 (Edward G. Gallagher ed., 1993).

34. See *Pearlman v. Reliance Ins. Co.*, 371 U.S. 132, 140 n.19 (1962) (“Suretyship is not insurance.”); *Buck Run Baptist Church, Inc. v. Cumberland Sur. Ins. Co., Inc.*, 983 S.W.2d 501, 504 (Ky. 1998) (“A contract of suretyship is not a contract of insurance.”); *Meyer v. Building & Realty Service Co.*, 196 N.E. 250, 254 (Ind. 1935) (“We are clearly of the opinion that the contract here in question is a contract of suretyship and not an insurance policy.”).

35. *Meyer*, 196 N.E. at 253-54 (emphasis added).

36. Armen Shahinian, *The General Agreement of Indemnity*, in THE LAW OF SURETYSHIP 487 (Edward G. Gallagher ed., 2d ed. 2000).

37. See, e.g., *Fidelity & Deposit Co. of Maryland v. Bristol Steel & Iron Works, Inc.*, 722 F.2d 1160, 1163 (4th Cir. 1983); *United States Fidelity & Guaranty Co. v. Feibus*, 15 F. Supp. 2d 579, 584 (M.D. Pa. 1998).

IV. Conclusion

Hydraulic fracturing presents several well-recognized circumstances that, if not performed in accordance with law, may result in adverse environmental impacts. For some of these certain risks identified by Professors Dana and Wiseman, surety bonds may be an appropriate mechanism to

provide backup funds if the primarily responsible party fails to conduct the required environmental restoration. For other less understood and more uncertain potential impacts of hydraulic fracturing, the true risk-shifting instruments of insurance policies may be more suited to providing the protections urged by the papers today.

C O M M E N T

Reflections on A Market Approach to Regulating the Energy Revolution

by Tom FitzGerald

Tom FitzGerald is the Director of the Kentucky Resources Council Inc., and is an Adjunct Professor of Energy and Environmental Law at the Brandeis School of Law, University of Louisville, Louisville, Kentucky.

These reflections are the author's own and are not presented in either of his professional capacities.

As a practitioner who has represented low-income individuals and community groups pro bono on environmental and energy development issues for over three decades, I appreciate the contribution of Professors Dana and Wiseman to the literature concerning the regulation of those particular risks and effects of the use of hydraulic fracturing and horizontal drilling to develop shale gas and oil from formations once considered inaccessible. Coming from a state that, like some 23 others in our nation, has enshrined in law a misguided, discredited policy of being “no more stringent than” minimum federal standards on air, water, and waste management, I can appreciate the particular challenges of crafting adequate mechanisms in state laws in the absence of a national regulatory framework with performance standards and compliance assurance mechanisms sufficient to assure that the risks associated with each stage of shale gas development—from exploration, well development, and stimulation to closure and site reclamation—are internalized rather than being shifted “off budget” onto those who live downhill and downstream.

Kentucky is not unique in its current level of regulation of the oil and gas industry. Most of the production from shales in Kentucky has been through nitrogen foam fracturing of more shallow vertical and horizontal wells, though there has been recently-expressed interest in exploration of deeper formations that would be hydro-fractured and horizontal wells. In 1960, Kentucky became a signatory to the Interstate Oil and Gas Compact and adopted state regulations aimed at conservation of the oil and gas resource, including well spacing, design, cementing, and other basic standards for well closure. In the 1970s, in response to the efforts of one county government to regulate gathering lines, the General Assembly preempted local

government regulation of the oil and gas industry (other than through planning and zoning). Kentucky requires performance bonds intended to provide for proper closure of wells; however, the allowance of “blanket bonds” and the limitations both on the amount of the bond and the uses that can be made of the bond monies leave the public and landowners on whose property exploration and production occur at risk in the case of non-performance.

I agree with the authors that, if engaged, the surety and insurance industry could become valuable partners in assisting in the mitigation of risks associated with hydrofractured horizontal well production. We have a historical example in Kentucky's coal industry, where a coal surety firm, founded and managed by a former state mining inspector, wrote policies and took an active role, uncharacteristic of the surety industry, in inspecting the mining operations and suggesting that actions be taken in order to mitigate risks through better mining and reclamation practices.

There are three main difficulties I see in the proposal to use insurance and surety mechanisms as a tool for mitigating risks. The first, recognized by the authors, is the concept of “regulatory capture.” In both the legislative and executive branches of state government, efforts to require full internalization by the industry of the costs associated with permitting, inspection, regulatory compliance, and site management and closure often face significant opposition from those in government allied with the industry's interests. Overcoming regulatory capture is essential to emplace bonding and other financial assurance requirements sufficiently rigorous to cause changes in operational performance in order to lessen or mitigate risks. One can look to the bonding programs under the 1977 Surface Mining Control and Reclamation Act to see the challenge. In that case, there was a federal mandate for full-cost rec-

lamation bonding. Yet 38 years out, there are still many states where the amount of bond posted is significantly less than needed to assure full reclamation in the event of operator non-performance.¹

The second hurdle is that of anticipating and mitigating risks that have a “long tail,” such as the closure of wells or reclamation of drilling pads and associated production areas, that may occur decades after the initial completion of the well and commencement of production. One can look to the financial markets in the last decade to see how difficult it is to predict whether an underwriting insurer or surety company will remain in business with assets sufficient to pay decades after the writing of a policy. Assuring there will be funds in 40-50 years to back up a promise made today is a daunting challenge.

The third challenge relates to the second, and that is whether the oil and gas industry could access insurance products that would underwrite these long-tail risks. The history of the Underground Storage Tank (UST) program under the Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act is an instructive example of this concern, since many states moved to publicly supported funds to provide insurance coverage because the insurance industry would not write policies insuring USTs from leakage, property damage, or personal injury.²

To say that the revolutionary development of hydrofractured horizontal wells has been controversial is an understatement of epic proportion. The heavy footprint of these operations, particularly in areas of the nation that historically have not seen industrial-scale natural resource extraction, has created significant local and state-level pushback from host communities and local governments. The industry brought much of this on itself by its repeated tone-deaf actions. For example, the industry sought regulatory exclusions to national underground injection control programs that would have otherwise insured the integrity of injection wells and receiving formations. Similarly, they sought regulatory exemptions to water pollution laws for sediment and runoff from well pads. Even now, industry continues to try to hide the identity of chemicals used in the fracturing process from the public. The industry would do well to better respect the correlation between risk and outrage, to engage state and local governments and communities in a more transparent manner, and to embrace meaningful standards of performance backstopped by sufficient financial assurance and compliance mechanisms as a cost of doing business.

Kentucky offers an example of how to develop such a program. Recognizing that the development of deep hori-

zontal wells using hydrofracturing was a possibility in Kentucky’s short-term future, and noting the controversy that has attended the industry in other states, the Kentucky oil and gas industry worked proactively through a consensus-based process with other stakeholders (including this author) to begin to modernize the regulatory framework for the oil and gas industry in Kentucky.

The first product of that eight-month process was enacted into law in the spring of 2015 as Senate Bill 186. It requires:

- Reclamation plans for all oil and gas production operations, including site closure;
- A fund for reclamation of abandoned tank batteries and a process for determining whether a tank battery is abandoned;
- Testing of any groundwater wells, springs, or down-gradient surface impoundments used for beneficial purposes, both before and after the drilling of a hydrofractured horizontal well, for TDS, methane, propane, ethane, alkalinity, BTEX, and gross alpha and beta;
- A cap on the number of wells that can be insured under a blanket bond, and an increase in permit fees and bonding amounts;
- A requirement to disclose information on the volume and composition of fluids used for well stimulation, and a limitation that the chemical identity of fracturing fluids cannot be claimed to be trade secret;
- A requirement to incorporate best management practices into site development and restoration.³

One issue that is anticipated to be resolved during 2015 workgroup negotiations is the development of assurance mechanisms such as those proposed by Professors Dana and Wiseman for addressing the long-tail risks associated with the closure of wells and completion of reclamation. Coal again provides an example of how to address the risk of nonperformance and to mitigate long-term unforeseen impacts, through the use of a “bond pool” or “pooled risk” mechanism funded through a combination of entry fees and production-based assessments. The use of a bond pool mechanism in lieu of, or preferably as an adjunct to, individual insurance or surety mechanisms is intended to provide funds in hand, managed by the regulatory agencies and funded through assessments paid during the productive life of the well, in order to provide a funded backstop in the event of nonperformance by the operator of closure and reclamation obligations. The funding would include an “entry” fee, in order to help capitalize the fund during the early years until it achieves actuarial soundness,

1. See Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. §1201 (2014).

2. See Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. §6901 (2014).

3. See S.B. 186, 2015 Leg., 15 Reg. Sess. (Ky. 2015).

supplemented by a production-based assessment to assure continued capitalization during the productive years of the wells. This mechanism, whether used in lieu of or in conjunction with individual insurance policies or surety bonds, helps to address the long tail between the posting of financial assurance mechanisms, and the time when the commitment to pay those funds may need to be discharged in order to insure that the risks of nonperformance

of reclamation and well closure obligations do not fall to downhill and downstream landowners and to owners of the property where the production had occurred.

The author thanks Professors Dana and Wiseman for their contributions to the growing body of scholarly research regarding the regulation of impacts of the “shale gas revolution.”

ARTICLE

The Military-Environmental Complex

by Sarah E. Light

Sarah E. Light is an Assistant Professor of Legal Studies and Business Ethics, Wharton School of Business, University of Pennsylvania.

Two competing theories vie for dominance regarding the relationship between the U.S. military and the natural environment. On the one hand, because legal rules permit the military to disregard environmental laws when they conflict with the military's national security mission, one might be left with the impression that the military's mission conflicts inexorably with environmental protection. Yet, the military is currently engaged in an extensive undertaking to improve its sustainable energy use by reducing demand for fossil fuels and developing renewable energy sources. The military is undertaking such actions not only in response to congressional directives and presidential executive orders, but also voluntarily in response to its operational and national security needs. In some cases, the military is leveraging private financing rather than taxpayer funds to drive innovation. Such cooperation among the military, private financiers, and technology firms has the potential to transform for the better not only our nation's energy profile, but also the military-industrial complex. This new Military-Environmental Complex should become a factor in the debate over regulatory instruments to combat climate change. At the same time, however, these relationships warrant some caution to prevent rent-seeking.

I. Military Exceptionalism

Environmental law doctrine tells us that the military is exceptional; when needs of national security and preparation for war conflict with environmental goals, environmental goals must bend. Indeed, many federal statutes not only acknowledge but support the view that the environment and national security are in conflict.

Under virtually all federal environmental laws, the President may grant time-limited, renewable waivers from environmental obligations for specific agency activities if

such waivers are “in the paramount interest of the United States” or in the interest of national security.¹ In some cases, the agency head—for example, the Secretary of Defense—rather than the President, may make that determination without further executive review.² In addition, in a time of national emergency or after a declaration of war, Congress has provided a blanket exemption for military construction projects “not otherwise authorized by law that are necessary to support such use of the armed forces.”³

In reality, however, the relationship between national security and the environment is far more complex.

A. Exceptional Mission Alignment

Despite these exemptions, the U.S. Department of Defense (DoD) has demonstrated that national security and the military's mission are deeply intertwined with the need to reduce energy use and develop alternative, renewable fuel sources. In fact, the DoD's exceptional energy use creates a unique synergy between the military's mission and the need for energy sustainability.

The DoD is the largest single consumer of energy in the nation.⁴ The military's total energy costs in fiscal year 2013 were \$18.9 billion, approximately \$4.1 billion of which were facility energy costs and \$14.8 billion of

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1. See, e.g., Toxic Substances Control Act, 15 U.S.C. §2621 (2012); Coastal Zone Management Act, 16 U.S.C. §1456(c)(1)(B) (2012); Clean Water Act, 33 U.S.C. §1323(a) (2006 & Supp. V); Safe Drinking Water Act, 42 U.S.C. §300h-7(h) (2006 & Supp. V); Resource Conservation and Recovery Act, 42 U.S.C. §6961(a); Clean Air Act, 42 U.S.C. §7418(b) (2006 & Supp. V); Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §9620(j) (2006 & Supp. V); see also Federal Leadership in Environmental, Energy, and Economic Performance, Exec. Order No. 13514, 3 C.F.R. 248 (2010) [hereinafter Executive Order on Sustainability].
2. See National Historic Preservation Act, 16 U.S.C. §470h-2(j) (2012); Marine Mammal Protection Act, 16 U.S.C. §1371(f)(1); Endangered Species Act, 16 U.S.C. §1536(j) (2012).
3. 10 U.S.C. §2808 (2012).
4. OFFICE OF THE DEPUTY UNDER SEC'Y OF DEF. FOR INSTALLATIONS AND ENV'T, DEPARTMENT OF DEFENSE ANNUAL ENERGY MANAGEMENT REPORT: FISCAL YEAR 2013, at 16 (2014), available at http://www.acq.osd.mil/ie/energy/energymgmt_report/FY%202013%20AEMR.pdf [hereinafter AEMR FY 2013].

which were operational energy costs.⁵ The DoD is also the nation's largest landlord⁶; it manages more than 500 installations in the United States and overseas, covering approximately 2.3 billion square feet of building space.⁷ The DoD manages approximately 28 million acres of land in the United States.⁸

The military's mission aligns with the goals of reducing energy demand, increasing energy efficiency, and increasing use of renewable energy. In the context of its fixed installations, the military has recognized potential threats if the electric power grid is disrupted, and is now seeking independent, renewable sources of energy to power its facilities. The military has recognized that dependence on fossil fuels on the battlefield creates security threats—such as the threat to soldiers protecting fuel convoys supporting combat missions. From fiscal year 2003 to fiscal year 2007 in Iraq and Afghanistan, more than 3,000 Army personnel and Army contractors were wounded or killed in action as a result of attacks on fuel and water resupply convoys.⁹ In 2010, ground convoys were attacked 1,100 times.¹⁰ These numbers may not even reflect all efforts to transfer fuel from forward operating bases to patrol bases. In both Iraq and Afghanistan, the challenges of securing fuel convoys made the need to reduce petroleum consumption paramount.¹¹ The military also recognizes that climate change, which is caused in part by fossil fuel consumption, will lead to further geopolitical instability. Unlike abstract concerns over the environment or energy independence, the military's national security mission has the power to stimulate innovation through specific demand in ways that echo the power of the historic military-industrial complex.

B. Exceptional Opportunities: Lessons From the Military-Industrial Complex

The military's role in supporting technological innovation that has spilled over into the civilian realm is a familiar phenomenon. Technological advances originally created for military needs have come into widespread civilian use. Such technologies include computers, satellites for aerial reconnaissance, certain kinds of aircraft, the internet, semiconductors, and the Global Positioning System.¹² Although perhaps most well-known for this explosion of scientific growth in the twentieth century, military stimulation of technological innovation has deep historical roots. For example, although the military originally produced its own armaments in national armories, beginning in the early 19th century, the Army began to rely on private firms to increase the supply.¹³ Because the quality of produced armaments was poor, the Army imposed certain requirements on manufacturers, including uniformity and the use of interchangeable parts.¹⁴ This led not only to the development of new armaments, but also to new “machine tools and precision instruments” which were subsequently adapted to manufacture civilian goods such as sewing machines.¹⁵

Today, rather than contracting for new, DoD-specific products, the military prefers to adopt preexisting civilian technologies—a process that at least one scholar has called “spin-on” to the military from the private sector, rather than “spin-off” to the private sector from the military.¹⁶ And sometimes, technology development and diffusion in the military-industrial complex took hybrid forms—neither completely “spin-off” nor “spin-on.”¹⁷

The key to obtaining military funding has always been articulating how the technological innovation is in the military's interest—or, more broadly, in the interest of national security. Civilian spin-offs have largely been a secondary benefit.¹⁸ In some cases, direct federal research and development (R&D) funding was not necessary to stimulate the development of these new technologies.¹⁹ Instead, the “prospect of large procurement contracts appears to

5. Facility energy “includes energy needed to power fixed installations and non-tactical vehicles.” *Id.* at 6 n.1. Operational energy is “the energy required for training, moving, and sustaining military forces and weapons platforms for military operations. The term includes energy used by tactical power systems and generators and weapons platforms.” *Id.* (citing 10 U.S.C. §2924(5) (2012)).

6. See *Fostering a Federal Community of Green Building Leaders*, CLOSING THE CIRCLE NEWS, Spring 2008, at 2, available at <http://www1.eere.energy.gov/femp/pdfs/ctcspr08.pdf>, archived at <http://perma.cc/B8YX-SYYM>.

7. AEMR FY 2013, *supra* note 4, at C-2; OFFICE OF THE DEPUTY UNDER SEC'Y OF DEF. FOR INSTALLATIONS AND ENV'T, DEPARTMENT OF DEFENSE ANNUAL ENERGY MANAGEMENT REPORT: FISCAL YEAR 2011, at 14 (2012), available at <http://www.acq.osd.mil/ie/library/FY.2011.AEMR.PDF>, archived at <http://perma.cc/8HVW-9P3Q> [hereinafter AEMR FY 2011].

8. See Amy L. Stein, *Renewable Energy Through Agency Action*, 84 U. COLO. L. REV. 651, 708 (2013); Press Release, U.S. Dep't of Def., Interior and Defense Departments Join Forces to Promote Renewable Energy on Federal Lands (Aug. 6, 2012), available at <http://www.defense.gov/releases/release.aspx?releaseid=15498>, archived at <http://perma.cc/CS7K-NBT8>.

9. DEP'T OF DEFENSE, ENERGY FOR THE WARRIOR: OPERATIONAL ENERGY STRATEGY 4-5 (2011) (citing ARMY ENVTL. POLICY INST., SUSTAIN THE MISSION PROJECT: CASUALTY FACTORS FOR FUEL AND WATER RESUPPLY CONVOYS, FINAL TECHNICAL REPORT (2009)), available at http://energy.defense.gov/Portals/25/Documents/Reports/20110614_Operational_Energy_Strategy.pdf, archived at <http://perma.cc/S3G7-E3J2>.

10. *Id.* at 5 (citing Gen. Duncan McNabb, Commander, U.S. Transp. Command, Address at the Military Strategy Forum at the Center for Strategic and International Studies (Feb. 7, 2011)).

11. *Greenery on the March*, ECONOMIST, Dec. 10, 2009, at 3, 3-4.

12. See, e.g., David C. Mowery, *Federal Policy and the Development of Semiconductors, Computer Hardware, and Computer Software: A Policy Model for Climate Change R&D?*, in ACCELERATION ENERGY INNOVATION: INSIGHTS FROM MULTIPLE SECTORS 163-66 (Rebecca M. Henderson & Richard G. Newell eds., 2011).

13. See Merritt Roe Smith, *Military Arsenal and Industry Before World War I, in WAR, BUSINESS, AND AMERICAN SOCIETY: HISTORICAL PERSPECTIVES ON THE MILITARY-INDUSTRIAL COMPLEX* 24-32 (Benjamin F. Cooling ed., 1977).

14. See *id.* at 31.

15. *Id.* at 32.

16. Jay Stowsky, *From Spin-Off to Spin-On: Redefining the Military's Role in American Technology Development*, in THE HIGHEST STAKES: THE ECONOMIC FOUNDATIONS OF THE NEXT SECURITY SYSTEM 114-16 (Wayne Sandholtz et al. eds., 1992).

17. See *id.* at 118.

18. Cf. Timothy Simcoe & Michael W. Toffel, *Government Green Procurement Spillovers: Evidence From Municipal Building Policies in California* 30-32 (Harvard Bus. Sch., Working Paper No. 13-030, 2013), available at http://papers.ssm.com/sol3/papers.cfm?abstract_id=2142085, archived at <http://perma.cc/V4AP-EU3T>.

19. See Mowery, *supra* note 12, at 165.

have operated similarly to a prize, leading [one firm] to invest its own funds in the development of a product that met military requirements.”²⁰

Given that the DoD is already both actively pursuing technological innovation to military specifications through R&D and exhibiting vast, mission-driven demand for commercial off-the-shelf technologies through procurement and long-term Power Purchase Agreements (PPAs), two questions arise. First, how should policymakers craft institutions and rules to make this government-sponsored innovation more successful? And second, how can policymakers guard against abuses such as rent-seeking, cost overruns and delays, and the lack of diffusion of knowledge that may have plagued government-supported innovation in the past? After examining the forces that are shaping the Military-Environmental Complex, this Article addresses these questions.

C. Advantages of the Military-Environmental Complex

There are certain unique advantages to military participation in this technological innovation process. First, the mere fact that a project supports military interests—rather than general commercial interests—may drive support among key institutional players who feel more strongly connected to the value of protecting national security than other values such as supporting commerce or protecting the environment.²¹ The construction of roads in 19th-century America provides an example of how an engineering project with both civilian and military applications obtained congressional funding and presidential support largely because of its alignment with the military’s mission.²² Presidential support was only forthcoming if the road could be deemed a “military” road, rather than a road to support general commerce.²³ Reliance on the synergy between the military’s interests and energy conservation may provide political cover for those who otherwise might not support investment in clean energy technology solely for civilian purposes or environmental reasons.

Second, the DoD’s exceptional hierarchical nature allows its leadership to consider the importance of changing norms and behavior in ways that might be unthinkable in the private sector. One well-known historical example is the racial integration of the military long before parts of the civilian world in the United States. By issuing an executive order and exploiting the hierarchical nature of his relationship with the military as Commander-in-Chief,

Truman was able to have an impact on behavior and attitudes toward racial integration that, some scholars argue, spilled over into the civilian realm.²⁴

II. Governmental Institutions and Values Driving the Military-Environmental Complex

Institutional players shaped by different values are driving the Military-Environmental Complex. This Part examines the role of Congress, the President and the DoD itself in creating this phenomenon.

A. Congressional Mandates

Despite its inability to pass comprehensive climate change legislation governing the private sector,²⁵ Congress has played a key role in the Military-Environmental Complex, both substantively—in directing the military to meet conservation and sustainability goals—and procedurally—by strengthening the institutions within the DoD that can make those goals self-reinforcing. Congress has imposed a number of mandates on all federal agencies to promote conservation, efficiency, and the development of renewable energy sources. These statutes require all federal agencies, including the military, to conserve energy and water in federal facilities²⁶; procure Energy Star products or Federal Energy Management Program (FEMP)-designated products,²⁷ among other requirements; and further create a federal energy efficiency fund to provide grants to agencies for such projects.²⁸ The focus of these mandates has largely been on facilities energy, rather than operational energy, which is often exempt from the mandates.

Congress has also authorized the DoD to enter into different creative financing agreements, including 30-year PPAs with private developers to promote the development of alternative energy generation on military lands.²⁹ These agreements are contracts for the “provision and operation of energy production facilities on real property under the Secretary’s jurisdiction or on private property and the purchase of energy produced from such facilities.”³⁰

20. *Id.*

21. See Sarah E. Light, *Valuing National Security: Climate Change, the Military, and Society*, 61 UCLA L. REV. 1772 (2014) (arguing that framing climate change as a national security issue, rather than an environmental issue, can affect individual attitudes, beliefs, and behavior in ways that implicate the debate over climate policy in the United States).

22. See Thomas E. Kelly, *The Concrete Road to MIC: National Defense and Federal Highways, in WAR, BUSINESS, AND AMERICAN SOCIETY*, *supra* note 13, at 133, 134-35.

23. *Id.* at 134.

24. Cf. SAMUEL A. STOFFER ET AL., *THE AMERICAN SOLDIER: ADJUSTMENT DURING ARMY LIFE 594-95* (1949); John Sibley Butler & Kenneth L. Wilson, *The American Soldier Revisited: Race Relations and the Military*, 59 Soc. Sci. Q. 451, 465 (1975).

25. For example, the American Clean Energy and Security Act of 2009, also known as the Waxman-Markey cap-and-trade bill, passed in the House but was defeated on the Senate floor. H.R. 2454, 111th Cong. (2009); see *American Clean Energy and Security Act of 2009*, GOVTRACK.US, <http://www.govtrack.us/congress/bills/111/hr2454>, archived at <http://perma.cc/CTQ4-HHPV> (last visited Jan. 27, 2015).

26. 42 U.S.C. §8253.

27. *Id.* §8259b.

28. *Id.* §8256(b).

29. 10 U.S.C. §2922a.

30. *Id.* This specific authorization by Congress is necessary to avoid violating the Antideficiency Act, which prohibits the obligation of funds in excess of an appropriation without authorization. 31 U.S.C. §1341 (2012); see Geraldine E. Edens et al., *Government Purchasing of Efficient Products and Renewable Energy, in THE LAW OF CLEAN ENERGY: EFFICIENCY AND RENEWABLES* 123 (Michael B. Gerrard ed., 2011).

B. Presidential Directives

Congress is not the only political institution shaping the Military-Environmental Complex. The President has likewise played a role, directing all federal agencies, including the DoD, to improve their energy profiles and thereby lead the nation by example. For example, in 2009, President Barack Obama signed Executive Order 13514, which requires all federal agencies to disclose greenhouse gas emissions information annually from their direct and indirect activities. The order also directs each agency to propose to the White House agencywide greenhouse gas emissions reduction targets to reach by fiscal year 2020 as compared to a fiscal year 2008 baseline.³¹ The executive order, however, includes a number of exemptions from these reduction targets for military operational energy use and in the case of national security conflicts.

C. Operational Energy

Although Congress and the President largely exempted operational energy from *substantive* mandates to reduce energy intensity, develop renewable fuel sources, and reduce greenhouse gas emissions, Congress employed *procedural* methods to encourage the military to reduce operational energy use. In the National Defense Authorization Act (NDAA) for Fiscal Year 2009, Congress created a new Office of Operational Energy Plans and Programs (OEP&P) within the DoD.³² The Office of OEP&P serves as a mechanism to render the goals of reducing demand and pursuing alternative energy sources self-sustaining within the agency, even if Congress does not or cannot mandate reductions in the operational energy sphere.³³

Congress tasked the OEP&P Director “to manage and be accountable for, operational energy plans and programs within the Department of Defense and the Army, Navy, Air Force, and the Marine Corps,” and to “establish the operational energy standard” for the DoD.³⁴

Thus, Congress initially created the Office of OEP&P to consolidate these strategic concerns and decisionmaking in one office and to report directly to the Secretary of Defense.³⁵ In contrast, the DoD’s policy for facilities energy was carried out through the Office of the Deputy Under Secretary of Defense (DUSD) for Installations and Environment.³⁶ In December 2014, pursuant to the 2015 National Defense Authorization Act, these two offices

merged, and are now under the direction of the Assistant Secretary of Defense for OEP&P.³⁷ This push to promote the focus on operational energy through procedural mechanisms did not come from Congress—it came largely from within the military itself.

D. The DoD’s Role as Self-Driver

Long before Congress created the Office of OEP&P or required reporting on operational energy use, military commanders serving in both Iraq and Afghanistan sought to decrease reliance on fuels out of a concern for soldiers’ lives and the mission. In July 2006, Marine Corps General Major Richard Zilmer, who at the time was the Commander of Multinational Force West in Iraq, sent the Pentagon a “Priority 1” rapid resource response request, asking for a “renewable and self-sustainable energy solution . . . to augment our use of fossil fuels with renewable energy, such as photovoltaic solar panels and wind turbines” so that fewer troops would die guarding fuel convoys in the theater of war.³⁸ For the DoD, therefore, fuel use is a source of risk to its soldiers.

More broadly, climate change is a source of geopolitical instability that affects the military’s mission. The DoD has played a key role in the Military-Environmental Complex as a validator of climate science,³⁹ and recognizes that climate change can accelerate conflict in ways that affect the national security of the United States. The solution, from the DoD’s perspective, is to reduce demand for energy, to increase energy efficiency, and to use renewable fuels that do not require the same long convoys to bring to the theater of war. Energy efficiency and reduced use can act as a “force multiplier”—missions can go farther without refueling, running generators, or bringing fuel convoys to the battlefield.⁴⁰

III. The Private Sector

A focus on governmental institutions should not obscure the significant role that the private sector plays in driving the Military-Environmental Complex. First, banks and

31. Executive Order on Sustainability, *supra* note 1.

32. Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, §902, 122 Stat. 4356, 4564-66 (2008).

33. Cf. Matthew D. McCubbins et al., *Structure and Process, Politics and Policy: Administrative Arrangements and the Political Control of Agencies*, 75 VA. L. REV. 431, 435-45 (1989).

34. Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, *supra* note 32, §902(a).

35. See National Defense Authorization Act for Fiscal Year 2010, Pub. L. No. 111-84, §§903(a)(4)-(5), 903(b), 123 Stat. 2190, 2424 (2009).

36. See DEP’T OF DEF., INSTRUCTION 4170.11, at 6 (Dec. 11, 2009), available at <http://www.dtic.mil/whs/directives/corres/pdf/417011p.pdf>, archived at <http://perma.cc/TNE6-X3GT>.

37. OFFICE OF THE DEPUTY UNDER SEC’Y OF DEF. FOR INSTALLATIONS AND ENV’T., I&E FEATURED NEWS, <http://www.acq.osd.mil/ie/> (last visited Mar. 19, 2015).

38. Paul McLeary, *Army and Marines Go Fossil Fuel-Free*, WORLDWATERSOLAR.COM (May 24, 2011), <http://www.worldwatersolar.com/wp-content/uploads/2011/08/PEAK-Army-And-Marines-Go-Fossil-Fuel-Free-May-24-2011-Aviation-Week.pdf>, archived at <http://perma.cc/6N6S-6LDN>.

39. U.S. DEP’T OF DEF., QUADRENNIAL DEFENSE REVIEW REPORT, at vi (2014), available at http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf, archived at <http://perma.cc/4JV8-TKER>; U.S. DEP’T OF DEF., QUADRENNIAL DEFENSE REVIEW REPORT, at iii, 84-88 (2010), available at http://www.defense.gov/qdr/images/_as_of_12Feb10_1000.pdf, archived at <http://perma.cc/DLM6-474Z>.

40. Memorandum of Understanding Between the U.S. Dep’t of Energy and the U.S. Dep’t of Def. 1 (July 22, 2010), available at <http://energy.gov/sites/prod/files/edg/media/Enhance-Energy-Security-MOU.pdf>, archived at <http://perma.cc/9R2Z-KTPU> (“Energy efficiency can serve as a *force multiplier*, increasing the range and endurance of forces in the field while reducing the number of combat forces diverted to protect energy supply lines, as well as reducing long-term energy costs.” (emphasis added)).

private developers pay significant upfront costs for major energy infrastructure projects on military lands to power the DoD's installations. Second, the DoD, at times in cooperation with other agencies, provides funding to private sector firms to finance the development of new technologies in test bed initiatives that may ultimately have civilian spin-off potential. Third, the private sector educates the DoD about lessons that private firms have already learned in the area of energy conservation. Finally, the DoD may be able to educate the private sector about its demand reduction strategies and new technologies as well.

A. *The Commercialization Valley of Death: Private Demand for Government Financing*

Part of the reason why government financing for new technology is so important lies in the so-called "Commercialization Valley of Death."⁴¹ With nearly all renewable energy technologies currently more expensive per kilowatt-hour than conventional fossil-fuel based energy,⁴² demand for and private investment in renewable energy generation is limited. This is in part due to the longer time horizon that is required to recoup capital investments in renewable energy technology. In particular, experts in new energy finance have identified two locations of insufficient capital.⁴³ The first is "early in a technology's development, just as it is ready to exit the lab"—immediately after the so-called "Technology Creation stage" in which universities or national laboratories fund technology development, but before venture capital becomes available.⁴⁴ The second valley occurs after venture-capital financing but before the technology becomes commercially available, and before the technology is proven on a widespread-enough scale that banks are willing to lend capital for large projects.⁴⁵ The Military-Environmental Complex lies at the crossroads of the private sector's need for financing support and the government's demand for new infrastructure, new technology, and existing technology on a large scale. It is no wonder that the private sector is trying to obtain DoD support for new technologies, given the private sector's needs for capital, and the DoD's track record of supporting the development of new technologies. If such new energy technology and sustainable methods are a social good, this demand for DoD support may be of great social benefit.

B. *Government Financing for New Technology Development*

There are significant disincentives to be a first-user of new technology. First-time users bear the largest costs on which

others can free ride.⁴⁶ Thus, the DoD can serve two important roles in the Military-Environmental Complex: as a first-user to evaluate the new "precommercial" technology, and as an early customer "thereby helping create a market, as it did with aircraft, electronics, and the internet."⁴⁷

Congress has supported this interaction between the military and the private sector explicitly by providing funding sources and other vehicles for cooperation. But government financing of private sector technology development is not the only face of the Military-Environmental Complex. Financing is also moving in the opposite direction. The DoD is actively leveraging private financing to adopt existing commercial technologies that reduce demand and generate renewable energy.

C. *Government Demand for Private Financing of Energy Infrastructure*

On the flip side of the private sector's demand for government financing lies the DoD's active quest for private financing as it seeks energy security for its facilities. Key statutory authority enables the DoD to leverage private financing by, for instance, entering into 30-year PPAs for renewable energy,⁴⁸ enhanced-use leases,⁴⁹ and energy-savings performance contracts.⁵⁰ Congressional authorization for these financing partnerships has been crucial.

First, the DoD has unique statutory authority among federal agencies to enter into PPAs of up to 30 years "for the provision and operation of energy production facilities on real property under the Secretary's jurisdiction or on private property and the purchase of energy produced from such facilities."⁵¹ In contrast, other federal agency PPAs for the purchase of utility services are limited to terms of 10 years or less.⁵² Second, the DoD can also lease property for large-scale renewable energy generation projects under its so-called "enhanced-use lease" authority.⁵³ Upon a determination by the Secretary of Defense that such a lease will "promote the national defense or . . . be in the public interest," the DoD may lease certain real or personal property that is not needed for public use, receiving in return either cash or in-kind consideration at fair market value.⁵⁴ Installations using enhanced-use lease authority can accept in-kind consideration in the form of a discount on the DoD's electric bill or in the form of infrastructure that will enhance energy security.⁵⁵ Under such an enhanced-use lease, a private developer may enter into

41. See BLOOMBERG NEW ENERGY FIN., *CROSSING THE VALLEY OF DEATH: SOLUTIONS TO THE NEXT GENERATION CLEAN ENERGY PROJECT FINANCING GAP* 3-7 (2010).

42. See *id.* at 4.

43. See *id.* at 5.

44. *Id.*

45. *Id.* at 5-6.

46. See *Installation Energy Test Bed*, SERDP, <http://www.serdp.org/Featured-Initiatives/Installation-Energy>, archived at <http://perma.cc/5PP7-7T98> (last visited Mar. 19, 2015).

47. *Id.*

48. 10 U.S.C. §2922a (2012).

49. *Id.* §2667.

50. *Id.* §2913; 42 U.S.C. §8287 (2006 & Supp. V).

51. 10 U.S.C. §2922a(a).

52. 40 U.S.C. §501(b)(1)(B) (2006 & Supp. V); FAR 41.103(a)(1).

53. See 10 U.S.C. §2667.

54. *Id.* §2667(a), (b)(4).

55. Interview with John Lushetsky, Former Exec. Dir., Army Energy Initiatives Task Force (May 14, 2013).

an agreement with the Secretary of Defense to lease DoD land to construct (among other things) a renewable energy generation facility.

Third, under an energy-savings performance contract, the energy service company (ESCO) “incurs the costs of project implementation, including audits, acquiring and installing equipment, and training personnel, in exchange for a predetermined price. Payment to the ESCO is contingent upon realizing a guaranteed stream of future savings, with excess savings accruing to the Federal Government.”⁵⁶ Each of these vehicles allows and encourages the DoD to leverage private financing for renewable energy projects.

D. Taking Advantage of Private Financing: The Energy Initiatives Task Force

The DoD is taking advantage of private financing in what was formerly known as the Energy Initiatives Task Force (EITF) program, now known as the Army’s Office of Energy Initiatives (OEI).⁵⁷ The Army initially created the EITF in September 2011, with the explicit goal of “collaborating with the private sector to invest in cost-effective, large scale (10 MW+) renewable energy projects” on Army installations.⁵⁸ These projects, which include solar, wind, biomass, and geothermal projects, are designed to promote “energy security and sustainability.”⁵⁹ Congress has mandated that the DoD produce or procure not less than 25% of its energy on installations from renewable sources by 2025,⁶⁰ which the military has translated into one gigawatt each for the Army, Navy, and Air Force.⁶¹ The OEI is the Army’s central management office for the execution of due diligence for potential projects, as well as for the initiation of permitting and other legal obligations like environmental impact assessments.⁶²

IV. Some Modest Recommendations

To the extent that congressional or presidential mandates or procedural mechanisms support the DoD’s drive to sustainable energy use, such legal rules should be encouraged. But a deeper understanding of the DoD’s own incentives must underlie any legislation or presidential action. The DoD is focused first and foremost on its mission, not simply on an abstract desire to protect the environment or to

promote energy independence. Some modest recommendations follow regarding how best to harness this exceptional alignment between the military’s mission and the need to change the way that energy in the United States is both generated and consumed.

First, Congress and the President should take steps to encourage both further efforts by the DoD to reduce energy demand and investment by private firms in the generation of renewable energy that benefits the military. Such steps would include expanding the financial incentives that encourage the military to reduce demand and invest in renewables. They would also include expanding the federal requirement that the DoD obtain 25% of its energy from renewable energy sources by 2025 to ensure that all players, both within the DoD and in the private sector, understand that these investments in renewables are long-term investments. Although the above analysis demonstrates that the DoD’s military goals have been the key underlying driver of the push to reduce energy demand and increase the development of alternative fuels, the underlying legal rules have undoubtedly shaped the DoD’s actions and priorities in the Military-Environmental Complex. They have also ensured a greater degree of continuity across administrations in ways that can encourage more stability in private investment. To the extent that Congress can incorporate into legislation additional incentives for private firms to continue to finance these major renewables generation projects, either through the tax code or other programs, taxpayers could save dollars in the long run.

Second, Congress should extend to agencies other than the DoD—most importantly, the General Services Administration, which purchases energy on behalf of other agencies—the ability to use 30-year PPAs as under 10 U.S.C. §2922a.⁶³ Congress should make universally available to agencies this provision that, according to the former Director of the EITF, has been essential in attracting private capital to finance the development and construction of large-scale renewable energy facilities that benefit both the military and the private sector.⁶⁴ Other agencies should be permitted to share in this potential for public-private partnerships.

Third, successful dissemination of information about technological innovation beyond government agencies requires openness rather than secrecy. Thus, to the extent that the military is driving innovation, it should promote the diffusion of technologies that can reduce conventional energy demand and develop renewables into the civilian world, rather than holding such technology close to the vest in the name of national security. Given the military’s role as a validator of climate science and its recognition that climate change has the potential to increase violent conflict in the world, diffusion is likely to be in the military’s interests in this context.

Relatedly, the DoD and the private sector should voluntarily create more mechanisms for interaction to share best

56. BARACK OBAMA, MEMORANDUM ON THE IMPLEMENTATION OF ENERGY SAVINGS PROJECTS AND PERFORMANCE-BASED CONTRACTING FOR ENERGY SAVINGS §6(b) (2011), available at <http://www.gpo.gov/fdsys/pkg/DCPD-201100920/pdf/DCPD-201100920.pdf>, archived at <http://perma.cc/8Z6L-8URC>.

57. See AEMR FY 2011, *supra* note 7, at 34; see also OFFICE OF THE DEPUTY UNDER SEC’Y OF DEF. FOR INSTALLATIONS AND ENV’T, DEP’T OF DEFENSE ANNUAL ENERGY MANAGEMENT REPORT: FISCAL YEAR 2012, at 36 (2014), available at http://www.acq.osd.mil/ie/energy/energymgmt_report/FY%202012%20AEMR.pdf.

58. *Id.*

59. *Id.*

60. 10 U.S.C. §2911(e) (2012).

61. See AEMR FY 2011, *supra* note 7, at C-12.

62. Telephone Interview with John Lushetsky, Former Exec. Dir., Army Energy Initiatives Task Force (Apr. 12, 2013).

63. 10 U.S.C. §2922a (2012).

64. See Telephone Interview with John Lushetsky, *supra* note 62.

practices, experiences with new technology, and behavioral approaches.⁶⁵ Universities could play an important role in this arena, and they should recognize that this area may prove fruitful for innovation. As centers of innovation both in technology and ideas, universities—and, more specifically, business schools, with their focus on promoting innovation in the private sector as well as investment and finance—could bring leaders from business and the DoD together on a regular basis.

Fourth, it is essential to be aware of the potential for the Military-Environmental Complex to lead to rent-seeking. Any time government funds are available, fraud, waste, and abuse are always a risk. Existing laws regulating lobbying and disclosure of contacts between the private sector and both Congress and the Executive branch, including the Lobbying Disclosure Act of 1995,⁶⁶ as amended by the Honest Leadership and Open Government Act of 2007,⁶⁷ go a long way to ensuring that contacts between industry and government are transparent. In addition, the *qui tam* provisions of the False Claims Act protect whistleblowers who report on fraud in government contracting.⁶⁸ Because the Military-Environmental Complex is new and developing, more empirical research is warranted regarding whether and in what circumstances there may be undue influence as opposed to normal political lobbying activity. Such research might include, for example, determining

which interest groups contact members of Congress and the military to seek support for particular projects, which geographic areas of the country stand to benefit, whether those projects are actually in the interest of national security and reducing climate change-related risks, whether the projects promote values other than the DoD's core mission, and the impact such contacts have as to whether particular projects are funded. Such research can inform policy questions about whether any more must be done to prevent rent-seeking and fraud.

V. Conclusion

The military's need to reduce its consumption of energy—a need deeply entwined with its national security mission—renders it a potential leader in the development and use of sustainable energy resources. The DoD has already taken important steps to reduce energy use, especially through partnering with the private sector. Keeping in mind the lessons of the military-industrial complex—and with controls to limit fraud, abuse, and rent-seeking behavior—these efforts should be expanded in the new Military-Environmental Complex. Properly regulated, the Military-Environmental Complex has an important role to play within the regulatory toolkit as a way to foster energy sustainability in the long term.

65. *Cf.* Goldberg Prods., Marstel Day & Darden Sch. of Bus., The Business Case for Sustainability in the U.S. Army (Mar. 2013) (on file with author).

66. Lobbying Disclosure Act of 1995, Pub. L. No. 104-65, 109 Stat. 691 (1995) (codified as amended at 2 U.S.C. §§1601-1611 (2012) and in scattered sections of 2, 15, 18, 22, 31, and 42 U.S.C.).

67. Honest Leadership and Open Government Act of 2007, Pub. L. No. 110-81, §§201-215, 121 Stat. 735, 741-51 (2007) (codified as amended at 2 U.S.C. §§1601-1611 (2012) and in scattered sections of 2 and 22 U.S.C.).

68. *See* 31 U.S.C. §§3729-3733 (2012).

C O M M E N T

No Such Thing as a Green War or a Bad Peace

by Sharon E. Burke

The Honorable Sharon E. Burke is a senior advisor to the New America Foundation's International Security Program.

Never had so many cities been taken and laid desolate . . . never was there so much banishing and blood-shedding, now on the field of battle, now in the strife of faction . . . there were earthquakes of unparalleled extent and violence; eclipses of the sun occurred with a frequency unrecorded in previous history; there were great droughts in sundry places and consequent famines, and that most calamitous and awfully fatal visitation, the plague.

—Thucydides, History of the Peloponnesian War, Book I

While U.S. military operations in the 21st century have largely been spared the nefarious results of “eclipses of the sun,” the central point of Thucydides’ account of a war that happened more than 2,000 years ago still holds: war is a calamity. War consumes money and natural resources and it destroys lives and land. There is nothing environmentally friendly about combat.

That core truth is largely absent from Sarah Light’s otherwise thoughtful article *The Military-Environmental Complex*. It is not “the military” that disregards environmental law, nor the Department of Defense (DoD) leadership that considers itself “exceptional” when it comes to such restrictions. It is war itself that has such contempt for life, livelihood, and the land. The fact that the U.S. Congress and the National Command Authority generally exempt warfighting activities from domestic environmental policy and law is not so much a case of “military exceptionalism” as it is a practical acknowledgment of the nature of war.

Indeed, it is worth noting that U.S. armed forces are not exempt from relevant international laws of war, such as the Geneva Convention’s prohibition on “long-term, widespread, and severe damage to the natural environment.”¹ The United States has ratified other relevant agreements as well, such as the Environmental Modification Convention that bans weather warfare.² Generally, though, environmental laws of war tend to be ambiguous (what exactly

counts as long-term, widespread, and severe damage, after all?) and difficult to enforce for the same basic reason the U.S. government exempts warfighting activities: it is tough to get around the fact that war is inherently destructive of the natural world.

So, this is the bottom line when it comes to the so-called military-environmental complex: any environmental benefit or effects U.S. armed forces might generate are dwarfed by the environmental damage war inflicts. Moreover, the benefits are largely incidental to the military’s defense mission.

To be fair, what Ms. Light is really highlighting in her article is the business of war, or rather the second-order effects of resourcing national defense, rather than war itself. Indeed, neither Congress nor the National Command Authority exempts the troops from complying with domestic laws when it comes to routine support activities, such as U.S. basing. Quite the opposite: as Ms. Light notes, there is a web of legislation, executive orders, and internal DoD policy that specifically targets environmental performance in circumstances other than military operations (and even operational equipment, in some cases). For fixed installations, these targets include energy intensity, renewable energy use, water use, greenhouse gas emissions, endangered species, hazardous materials cleanup, and other considerations.

By using the term “military-environmental complex,” however, Ms. Light implies there is something unsavory, immutable, or at least economically distorting about the scale of the DoD’s spending on environmental goods and services. That seems unjustified.

President Eisenhower originally used the term “military-industrial complex” to refer to the “unwarranted influence” in politics, the economy, and even “the very structure of our society” that could result from the confluence of an “immense military establishment and large arms industry.”³ And while national defense spending is lower as

1. Protocol Additional to the Geneva Conventions of 12 Aug. 1949, and Relating to the Protection of Victims of International Armed Conflict art. 35, June 8, 1977, 1125 U.N.T.S. 3, available at <https://www.icrc.org/ihl/WebART/470-750044?OpenDocument>.
2. United Nations Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Dec. 10, 1976,

1108 U.N.T.S. 151, available at https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&cmdsg_no=XXVI-1&chapter=26&lang=en.

3. President Dwight D. Eisenhower, Farewell Address (Jan. 17, 1961) (transcript available at http://eisenhower.archives.gov/research/online_documents/farewell_address.html).

a proportion of GDP (3.8%) today than it was in President Eisenhower's time (around 10%), his warning still rings true. For Fiscal Year 2015, the nation will spend at least \$554 billion on defense, more than the next seven nations combined.⁴ That spending continues to have a significant effect on U.S. politics and the economy.

And it is true: sometimes it seems as though a community of contractors and consultants surrounds the Pentagon like the ring of Saturn. Some of those companies and individuals may be little more than war profiteers, but most play an indispensable role in supporting the national defense. Indeed, U.S. armed forces have long depended on the private sector to develop the materiel they need to defend the country, although this is more a transactional relationship than a partnership or the rent-seeking behavior Ms. Light describes.

As Ms. Light also notes, defense business transaction is not all bad news: military purchases of R&D and equipment can provide a powerful innovation pull, resulting sometimes in technologies that greatly benefit the civilian economy as well. But there are no guarantees. The Internet, for example, may be ubiquitous in global civilian life, but stealth technology is not. Again, the core purpose of that spending is to support warfighting and related activities, not economic development.

It is hard to justify the contention that DoD is distorting national environmental investments, however. Compared to the overall defense budget, DoD's spending on environmental goods and services is not significant. For Fiscal Year 2015 (FY 2015), the DoD requested \$3.5 billion for all environmental programs, less than one percent of the total defense budget request (compared to, say, the \$8 billion or so requested for the Joint Strike Fighter in the same budget). At least one-third of the environmental budget was budgeted for cleanup of contaminated sites.⁵ Not counted in that figure are energy improvements for military operations, which totaled some \$1.7 billion in 2015 and were concentrated on such investments as engine upgrades. That amount is small relative to other energy spending, such as the fuel bill of around \$15 billion in the same year.⁶ In terms of the overall economy, the size of the U.S. market for environmental goods and services has been

estimated to be around \$300 billion,⁷ so the DoD would account for about 1% of the market.

Those direct purchases certainly may be beneficial, both on their own merits and as a catalyst for additional civilian investment and innovation. They may influence the business decisions of companies involved in supply relationships with the DoD. More to the point, even if the DoD's direct spending on environmental goods and services is relatively small, the Department can create third-order environmental benefits in the *way* it spends money in support of both the business of war and warfighting. After all, the DoD also requested in FY 2015 more than \$5 billion for military construction, \$8 billion for sustainment and recapitalization of existing facilities, and \$154 billion for acquisitions.⁸ Indirect environmental benefits of this spending might come from updated building codes for military construction that account for climate change or facility retrofits that improve energy efficiency. The Joint Staff now has an Energy Key Performance Parameter it has to consider for new weapons systems.⁹ And as Ms. Light rightly points out, military bases have the authority to enter into Power Purchasing Agreements, Enhanced Use Leases, and Energy Savings Performance Contracts with private companies that can fund renewable energy or energy efficiency projects on military bases at no additional expense to U.S. taxpayers. In all of these cases, the environmental improvements tend to benefit defense investments, rather than defense dollars being directed to a primarily environmental end. The benefits range from better resilience of facilities, better performance of equipment, or a lower operations and maintenance or lifecycle cost.

While these sorts of indirect benefits can create a demand-pull for environmental goods and services, Ms. Light's assertion that "the military's mission aligns with the goals of reducing energy demand, increasing energy efficiency, and increasing use of renewable energy"¹⁰ is something of an overstatement. Indeed, the office I once led as the Assistant Secretary of Defense for Operational Energy Plans and Programs, which Ms. Light points to as evidence of this alignment, was established by statute in the 2009 Defense Authorization and basically disestablished in the 2015 Defense Authorization as part of an

4. See *The U.S. Spends More on Defense Than the Next Seven Countries Combined*, PETER G. PETERSON FOUNDATION (Apr. 13, 2015), http://pgpf.org/Chart-Archive/0053_defense-comparison.

5. See *Budget and Oversight Hearing Before the Subcomm. on Military Construction, Veterans Affairs, and Related Agencies of the H. Comm. on Appropriations*, 114th Cong. (2014) (statement of John Conger, Acting Deputy Under Secretary of Defense for Installations and Environment), available at http://www.acq.osd.mil/ie/ie/Testimony/HAC-M%20E%20Conger%20Posture%20Statement_March_12_2014_FINAL.pdf.

6. See Katerina Okarsson, *U.S. DoD's Energy Cost Projections for Fiscal Year 2015*, J. ENERGY SECURITY (June 25, 2014), http://www.ensec.org/index.php?option=com_content&view=article&id=555:us-dods-energy-costs-projections-for-fy2015&catid=141:military-energy-efficiency&Itemid=431.

7. See Jane Drake-Brockman, *Environmental Goods and Services: Export Opportunities and Challenges Especially for Developing Economies*, INT'L TRADE CTR. (presentation Aug. 13, 2014), http://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Sectors/Service_exports/Trade_in_services/APEC%20Seminar%20on%20Environmental%20Goods.pdf.

8. Todd Harrison, *Analysis of the FY 2015 Defense Budget*, CTR. FOR STRATEGIC & BUDGETARY ASSESSMENTS (Sept. 4, 2014), <http://csbaonline.org/publications/2014/09/analysis-of-the-fy2015-defense-budget/>.

9. See Alan Bohnwagner, *An Overview of the Energy Key Performance Parameter*, DEPT. OF ENERGY (Dec. 9, 2013), <http://energy.defense.gov/Media/Blog/tabid/2569/Article/566470/an-overview-of-the-energy-key-performance-parameter-kpp.aspx>.

10. Sarah E. Light, *The Military-Environmental Complex*, 55 B.C. L. REV. 879, 892 (2014).

organizational efficiency initiative. For that matter, if the Commander-in-Chief directed U.S. armed forces to deploy halfway around the world tomorrow, which could happen at any time, the DoD's petroleum use would skyrocket. Moreover, a number of newer weapons systems, such as the Joint Strike Fighter or the Littoral Combat Ship, use more fuel than the platforms they are replacing. Both the manufacture and use of munitions involve more environmental harm than good. Again, this comes back to a central point: the U.S. military's core mission is to fight wars, and war is inherently consumptive and destructive.

But there is a case to be made that good environmental performance can, in fact, *complement* the military's mission, even though it will never trump that mission. Again, this comes back to the *way* the military pursues its ends. A military that consumes less fuel, for example, may be less vulnerable and more resilient to attacks on its supply line, as Ms. Light notes. A military that incorporates energy and environmental security into its planning may have more success at stabilizing post-conflict situations and developing partnerships with other countries where it operates. A military that is a good steward of the environment around its bases may have better relationships with the supporting community, with benefits that range from better recruiting to more secure access to overseas locations. For that matter, a military that has more efficient and sustainable resource use incorporated on the front end of weapons development, base construction, and troop deployments may have more range and endurance on the battlefield, a less burdensome logistics footprint, and less cleanup and retrograde of equipment when the mission is complete. This is not the military the United States has at this time, although there has been some progress in recent years.

So, Sarah Light is absolutely right that military investments can produce environmental benefits and that good environmental policy can have military benefits. There is certainly a market there for the private sector, albeit one that can be fickle or difficult to navigate. But there is no military-environmental complex. In fact, the U.S. military mission that is most environmentally beneficial is arguably war prevention (also a core responsibility for the DoD). "Few people will ever experience, nor should they, the immediate aftermath of close, continuous primordial combat," Colonel Keith Nightingale (U.S. Army, retired) wrote of Vietnam:

If observed by a detached eye, and there never are any, the first impression is one of junk, the awful and varied detritus of a battlefield . . . The ground is littered with a snowflake mass of chipped leaves, branches and wood parts—fresh and bleeding their sap of life. The dirt is very fresh, overturned and refined with forces a plow could never muster, pungent with organic decay and chewed to fine material separated by larger clods of muddy confluence. On top, larger logs and branches, the remains of once vertical trees, lay in random patterns as part of a failed giant jackstraw game. Piercing through are the remaining stumps of the original growth with supplicating shards of irregular height exposing the still oozing cambium, bark and core red inner hearts . . . Flies already festoon the corpses and provide the only sound in an otherwise silent scene.¹¹

War should only be what the nation does when there is nothing else to be done, but make no mistake: the environment is going to be a "silent victim" whenever nations go to war.¹²

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11. Keith Nightingale, *A Few Moments After* (Aug. 2014) (unpublished manuscript) (on file with author).
 12. UNITED NATIONS ENVIRONMENT PROGRAMME, PROTECTING THE ENVIRONMENT DURING ARMED CONFLICT: AN INVENTORY AND ANALYSIS OF INTERNATIONAL LAW (2009), available at http://postconflict.unep.ch/publications/int_law.pdf.

C O M M E N T

Remarks on *The Military-Environmental Complex*

by Amanda Simpson

Amanda Simpson is the Executive Director of the Office of Energy Initiatives, U.S. Department of the Army.

The U.S. Army Office of Energy Initiatives is the central management office for large scale renewable energy projects leveraging third-party financing to bring energy resiliency to our Army installations. I would like to thank Professor Light for including the efforts of what is now the Office of Energy Initiatives in her paper. It was the success of the original task force that brought about the transition to an enduring office last year.

The United States Army has long recognized that if we are to be successful in our primary national defense mission, we have an obligation to ensure that our Soldiers today—and the Soldiers of the future—have the land, water, and air resources they need to train; a healthy environment in which to live; and the support of the local communities of the American people.

Environmental Stewardship:

The paper implies that the military does not have to comply with environmental regulations “when they conflict with the military’s national security mission.” In fact, we do have to be in compliance as the process for a National Security Exclusion is so onerous that it is unlikely to be approved. So to that end, the scope of our environmental stewardship responsibilities is amazing. The Army is responsible for nearly 14 million acres of land. We care for 217 endangered species, over 83,000 archeological sites, and over 62,000 historic buildings. We are also managing over 3,000 environmental permits, 1.3 million acres of wetlands, and are currently conducting environmental cleanup at over 1,600 sites. And we do it very well. The endangered red-cockaded woodpecker’s habitat has been so well protected at Fort Stewart, Georgia, that the population has recovered; and they are being exported to other areas for reintroduction. While we harvested over 790 acres of timber for the solar projects that will provide 90MW of clean affordable

Author’s Note: This Comment is based on a transcript of Ms. Simpson’s remarks at the April 10, 2015, Environmental Law and Policy Annual Review conference in Washington, D.C. The remarks were originally posted on the Assistant Secretary of the Army for Installations, Energy, & Environment’s website, available at http://www.asaie.army.mil/Public/ES/oei/docs/ELPAR_Remarks.pdf.

power at Forts Stewart, Benning, and Gordon, the Army will plant over 2,100 acres over the next two years of native longleaf pine, the habitat of the red-cockaded woodpecker, as part of the Army’s Environmental Enhancement and Protection Program.

Sustainability Strategy:

The soon to be released Army Energy Security and Sustainability strategy establishes the underlying basis for an Army that adopts “security,” “resiliency,” and “future choice” as an organizing principle. The “Army Facilities Management” regulation, 420-1, is currently being revised to incorporate net zero in all its aspects, instilling these principles in everything the Army does to support its mission.

Operational Energy:

The Army’s energy and sustainability strategy does not end at our borders. When our current operations in Afghanistan and Iraq began, our enemies sought out our vulnerabilities; and they found and attacked our most susceptible point—our supply chain. Convoys carrying water, fuel, and supplies represented our greatest loss of life. We learned and we adapted. A forward outpost that a few years ago required replenishment of fuel and water every four days, through the employment of more energy efficient equipment, incorporation of tactical solar and wind power generation coupled with electrical storage, now only needs replenishment once every 10 days.

Fuel efficiency, energy conservation, waste reduction, and water reuse are not just phrases but integrated into our requirements and designs for the modernization of equipment—tactical vehicles and buildings—even temporary ones. Resource efficiency is necessary for the Army to minimize risk to mission objectives and reduce exposure of our Soldiers.

Climate Impact:

Climate change is a threat to the ability of the Army to perform its missions, affecting its installations and opera-

tions through impacts on training and Soldier and equipment readiness. As a global phenomenon, climate change will further stress regions and individual countries. The Army's ability to accomplish our missions on a global scale depends on secure, uninterrupted access to the resources it needs including energy, water, land, and air. In the last 10 years, we have seen over a four-fold increase in power interruptions on Army installations from increasingly severe and frequent weather events to sabotage.

The Army is actively addressing climate change by examining what effects it will have on its installations and operations, and what adaptations can be made to lessen resource dependence while not reducing effectiveness. These adaptations are holistic, involving technology, behavior, doctrine, and other areas because of their interconnectedness and dependencies.

Technologies:

Currently exceptional opportunities exist for the military and the Army, in partnership with the private sector, to move ahead with the implementation of energy savings and renewable generation initiatives. The Army continues to support R&D and provide "test-beds" for new renewable technologies on its installations, particularly for microgrids and storage technologies that have the potential to improve energy security. But, because of sequestration and other military budget reductions, Federal funding for these opportunities is highly competitive.

GENERAL AGREEMENT

Professor Light's paper presents a good overview of the military's position and response to increasing threats to our energy and water security and, our mission to protect the nation. She discusses how the military is leveraging private financing rather than taxpayer funds to drive innovation and that such public-private partnerships among the military, private financiers, and technology firms are an essential form of collaboration with the potential to transform our nation's energy profile for the better.

Mandates:

Professor Light also observes that Congressional and Presidential long-term energy and environmental mandates can provide "continuity across administrations" and promote stability and confidence in the private markets. The Army supports energy mandates and reporting requirements, as they provide direction and help measure our progress; but they must be realistic in light of current budgets and development timelines.

Financing:

In light of reduced government funding levels, innovative public-private risk sharing deal structures are being used

to finance energy and water conservation, demand reduction, and development of renewable generation projects. These include 30-year power purchase agreements (PPAs), enhanced use leases, and energy savings performance contracts. Regulatory and policy support for development of energy projects in partnership with the private sector is essential to effective use of these agreements.

Office of Energy Initiatives (OEI):

The OEI is used as an example of how the government can take advantage of private financing to develop large-scale renewable energy projects that it could not otherwise afford to build with appropriated funds. The OEI mission is to improve the energy resiliency of our Army installations so they can continue to conduct their critical national security missions in times of limited access to electrical power from the grid, whether caused by natural disasters or national emergencies. Due to existing financial limitations, cooperation with private industry is the most expeditious and financially prudent method to bring large scale generation stations on-line. Using off-the-shelf technologies, the OEI employs long-term PPAs to build facilities to provide power to the installation, or long-term leases to private developers to build facilities on Army land to provide power to outside off-takers. We also leverage existing agreements between utilities and the Army through General Services Administration (GSA) Area-wide contracts to build renewable generation facilities.

I am excited to announce that the Army currently has over 20 project opportunities in our development portfolio, representing over 550MW of potential renewable energy generation at Army installations across the country. Two projects are operational, including the recently commissioned biomass power plant that provides 100% of the electricity at Fort Drum, New York, and the DoD's largest solar project to date at Fort Huachuca, Arizona. Two are under construction, including the solar facility at Fort Detrick, Maryland, for which we just broke ground last week, and what will become the DoD's largest solar project at Fort Benning, Georgia—the ceremonial ground breaking is next week.

Energy Savings Performance Contracts (ESPCs):

The Army has led the Federal government in the use of Energy Savings Performance Contracts to successfully reduce demand and improve energy efficiency. ESPCs enable energy service companies to implement energy and water savings technologies on Army bases—and the Army pays back the company for the project with the realized savings. The Army has executed over \$700 million of ESPCs towards the President's performance contracting challenge, representing 40% of the Federal Government's total.

Net Zero:

The Army Net Zero Strategy strives to bring the overall consumption of energy, water, and waste on our installations down to an effective rate of zero by using the principles of integrated design to appropriately manage resources. Net Zero is considered a Force Multiplier because reducing our energy, water, and waste demands frees up resources that can then be used to achieve Army missions. Once a pilot initiative, Net Zero is now policy at all permanent Army installations.

Lessons Learned/Communication:

The value of lessons learned and open communication with the private sector is emphasized by Professor Light. Each of the Army efforts just discussed has brought the Army and the private sector together and shown the value of sharing lessons learned—sharing with our industry partners how the government process works, as we learn industry best practices and establish a mutual understanding of each other's needs and requirements. Collaboration with other government agencies, industry, NGOs, academia, and our surrounding communities is a long-standing Army practice that continues to benefit all parties.

One of the lessons learned by the OEI in our work with the private sector is that there are two requirements for a successful project. Reasonable profit must be made by private developers who invest in our projects, and the projects must serve the Army mission. Only by developing competitive, commercially viable projects, can we successfully attract private investors to finance them. And only if these projects support the Army mission will the OEI be trusted to work with the installations that benefit from the projects. This dual requirement minimizes the risk of a return to the excesses of the past.

Summary:

Professor Light states that there is a competition between the needs of the U.S. military and the natural environment. We don't see it that way. The slogan of one Army Project Management Office is "The World's Ultimate Weapon Runs on Water, Everything Else Runs on Fuel." Today's Army evaluates energy, water, and land use in every decision as it not only affects the true life cycle cost of operations and the potential success of our mission, but lack of adequate evaluation of these impacts could place at risk America's most precious resource—our posterity.

ARTICLE

Taking Public Access to the Law Seriously: The Problem of Private Control Over the Availability of Federal Standards

by Nina A. Mendelson

Nina A. Mendelson is the Joseph L. Sax Collegiate Professor of Law, University of Michigan Law School.

In the 1930s, Harvard professor Erwin Griswold famously complained about the enormous numbers of New Deal regulations that were obscurely published on individual sheets or in “separate paper pamphlets.”¹ Finding these binding federal rules was difficult, leading to “chaos” and an “intolerable” situation.² Congress responded, requiring that agencies publish all rules in the *Federal Register* and in the *Code of Federal Regulations* (CFR).³ Currently, recent federal public laws, the entire *U.S. Code*, the *Federal Register*, and the CFR are all freely available online as well as in governmental depository libraries.⁴

But with respect to thousands of federal regulations, the clock has been turned back—and worse. To save resources and build on private expertise, federal agencies have incorporated privately drafted standards into numerous federal regulations, but only by “reference.” These standards range widely. The CFR presently contains nearly 9,500 “incorporations by reference” of standards, often referred to as “IBR” rules. Many IBR rules incorporate privately

drafted standards from so-called “standards development organizations” or “SDOs,” organizations ranging from the American Society for Testing and Materials (ASTM) to the American Petroleum Institute (API).⁵ Recent IBR rules cover food additives, pipeline operation, and infant product safety.⁶ Agency use of IBR rules is likely to grow. Since the 1990s, both executive branch and congressional policies have officially encouraged agency use of privately drafted standards.

An individual who seeks access to this binding law generally cannot freely read it online or in a governmental depository library as she can the *U.S. Code* or the rest of the CFR. The SDOs generally claim copyright and reserve the right to earn revenue by selling standards. Accordingly, an individual typically must first locate the standard, either on the SDO’s website or by contacting the SDO, and then pay a significant SDO-set access fee. Otherwise she must travel to Washington, D.C., to the Office of the Federal Register’s (OFR) reading room.⁷

This law, under largely private control, is not formally “secret,” but it is difficult to find and expensive. The incorporated standard for infant sling carriers is currently priced at \$51.60⁸; incorporated pipeline safety standards are roughly \$150 per standard⁹; others can be far more

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1. Erwin Griswold, *Government in Ignorance of the Law—A Plea for Better Publication of Executive Legislation*, 48 HARV. L. REV. 198, 199, 294 (1934). Griswold notes that the thousands of pages of “law” issued in one year were “scattered among 5,991 press releases during this period.” *Id.* at 199. These laws included hundreds of “industry” codes drafted under the auspices of the National Industrial Recovery Act. See Mila Sohoni, *Notice and the New Deal*, 62 DUKE L.J. 1169, 1179 (2013).
2. Griswold, *supra* note 1, at 204, 205.
3. Note, *The Federal Register and the Code of Federal Regulations—A Reappraisal*, 80 HARV. L. REV. 439, 440-41 (1966).
4. E.g., Thomas, LIBRARY OF CONG., <http://thomas.loc.gov> (last visited Sept. 29, 2013) (access to legislative materials); *Federal Digital System*, U.S. GOV’T PRINTING OFFICE, <http://www.gpo.gov/fdsys> (last visited Sept. 29, 2013) (providing decades of access to the CFR, *Federal Register*, and all statutes).

5. Emily S. Bremer, *Incorporation by Reference in an Open-Government Age*, 36 HARV. J.L. & PUB. POL’Y 131, 150 (2013).
6. E.g. Pipeline Safety: Periodic Updates of Regulatory References to Technical Standards and Miscellaneous Amendments, 78 Fed. Reg. 49996-99 (Aug. 16, 2013) (noting 64 incorporated-by-reference standards, including safety, transport, and public notification); Food Additive Regulations: Incorporation by Reference of the Food Chemicals Codex, 7th ed., 78 Fed. Reg. 71457 (Nov. 29, 2013); Safety Standards for Infant Walkers and Infant Swings, 78 Fed. Reg. 37706 (June 24, 2013).
7. Agencies also sometimes provide access in their reading rooms, typically in Washington, D.C.
8. *Standard Consumer Safety Specification for Sling Carriers*, ASTM INT’L, <http://www.astm.org/DATABASE.CART/HISTORICAL/F2907-14A.htm> (last visited Mar. 27, 2015). Although ASTM maintains a “reading room,” as of March 2015, the standard was inexplicably unavailable.
9. Emily Bremer, *On the Cost of Private Standards in Public Law*, 63 U. KAN. L. REV. 279, 315 (2015).

expensive. Others have discussed the difficult question whether SDOs still possess a valid copyright in standards that an agency incorporates by reference. More generally, the IBR rule problem raises the question of what underlies the intuition that law, in a democracy, needs to be readily, publicly available.

Ready public access to the law is critical to provide notice of obligations not only to regulated entities, but also to consumers, neighbors, and other regulatory beneficiaries. This concern has been incorporated into constitutional due process doctrine.¹⁰ Access is also vital to ensure that federal agencies are meaningfully accountable to the public for their decisions.¹¹ Finally, expressive harm—a message inconsistent with core democratic values—is likely to flow from governmental adoption of regulatory law that is, in contrast to American law in general, harder to find and costly to access.

Fully considering why law needs to be public and how public it needs to be strengthens the case for IBR reform, whether administrative or legislative. It also limits the range of acceptable reform measures. The Freedom of Information Act (FOIA) permits incorporations by reference into the *Federal Register* only when the incorporated text is “reasonably available to the class of persons affected thereby.”¹² A clearer understanding of why law needs to be readily, publicly available could inform judicial interpretations both of FOIA and of the Administrative Procedure Act’s (APA’s) public participation requirements.¹³ In 2013, the OFR, which FOIA tasks with approving agency incorporations by reference, agreed to revise its rule. In November 2014, the OFR issued a final rule¹⁴ that, unfortunately, missed an opportunity to significantly expand the public availability of the thousands of IBR rules. But even if the OFR does not take on broader reform, individual agencies also could change their incorporation practices.

Finally, assessing public access needs in the setting of agency use of privately drafted IBR rules also sheds some light on how we should think about the value of governmental transparency. The law must be sufficiently public, with a meaningful level of free availability, to provide notice, ensure that government is accountable for its decisions, and to express a commitment to core democratic values.

I. Incorporation by Reference of Private Standards

A. The Use and Costs of Privately Developed Standards

In 1966, Congress included a provision in FOIA permitting the director of the *Federal Register* to approve an agency’s “incorporation by reference” of material published elsewhere into regulatory text without reprinting it in the *Federal Register*.¹⁵ The material must, however, be “reasonably available to the class of persons affected thereby.”¹⁶ Beyond this requirement, OFR regulations permit incorporation by reference of a publication only if it “substantially reduces the volume of material published in the Federal Register.”¹⁷ The publication must also consist of “published data, criteria, standards, specifications, techniques, illustrations, or similar material.”¹⁸ Congress expected this material at least to be available in libraries.¹⁹

In the mid-1990s, both Congress and the White House directed agencies, where practicable, to utilize privately developed standards rather than writing new “government-unique” standards. The Office of Management and Budget (OMB) issued Circular No. A-119 in 1982, most recently revising it in 1998, directing agencies to rely on voluntary standards, including industry standards or consensus codes, rather than “government-unique standards.”²⁰ After the publication of the original version of this article, OMB announced proposed revisions to Circular A-119, but the proposed revisions continue to emphasize use of such standards.²¹

Some such standards have been drafted without anticipating agency incorporation.²² Others undoubtedly have been written with the hope—or the plan—of incorporation into federal regulatory law.²³ Circular No. A-119 contemplates that agencies may provide financial support to an SDO to complete a standard.²⁴ Agency officials may also participate in SDO deliberations.²⁵

15. 5 U.S.C. §552(a)(1) (2012).

16. *Id.*

17. 1 C.F.R. §51.7(a)(3) (2013).

18. *Id.*

19. See Peter L. Strauss, *Private Standards Organizations and Public Law*, 22 WM. & MARY BILL RTS. J. 497, 519 (2013).

20. OFFICE OF MGMT. & BUDGET, CIRCULAR NO. A-119 REVISED: FEDERAL PARTICIPATION IN THE DEVELOPMENT AND USE OF VOLUNTARY CONSENSUS STANDARDS AND IN CONFORMITY ASSESSMENT ACTIVITIES para. 1 (1998) [hereinafter CIRCULAR NO. A-119], available at http://www.whitehouse.gov/omb/circulars_a119.

21. Request for Comments on a Proposed Revision of OMB Circular No. A-119, 79 Fed. Reg. 8207 (Feb. 11, 2014). Proposed revisions are available at WHITEHOUSE.GOV, INFORMATION POLICY, http://www.whitehouse.gov/omb/inforeg_infopoltech (last visited Feb. 18, 2015).

22. *E.g.*, Strauss, *supra* note 19, at 546.

23. *Id.* at 513.

24. CIRCULAR NO. A-119, *supra* note 20, para. 7(b).

25. See Strauss, *supra* note 19, at 506.

10. See, e.g., Nina A. Mendelson, *Regulatory Beneficiaries and Informal Agency Policymaking*, 92 CORNELL L. REV. 397, 414 (2007).

11. *E.g.*, Kathleen Clark, *The Architecture of Accountability: A Case Study of the Warrantless Surveillance Program*, 2010 BYU L. REV. 357, 389-404.

12. 5 U.S.C. §552(a)(1) (2012).

13. See 5 U.S.C. §552(a) (2012) (Freedom of Information Act); 5 U.S.C. §553 (2012) (Administrative Procedure Act rulemaking requirements).

14. Incorporation by Reference, 79 Fed. Reg. 66267 (Nov. 7, 2014).

In developing policy favoring the use of private voluntary standards, neither Congress nor the original drafters of OMB Circular No. A-119 appeared to anticipate that SDOs would both claim copyrights in their incorporated standards and charge access fees. In any event, current agency practice is to incorporate standards even if SDOs charge a significant price for access,²⁶ and OFR's rule requires only that agencies "discuss" what was done to provide public access to an incorporated rule. Meanwhile, the amounts charged far exceed the "direct costs of search, duplication, or review" that federal agencies may charge for FOIA requests for internal agency documents.²⁷ As numerous groups and citizens have recently written, the fees that SDOs charge can be prohibitive, particularly for ordinary citizens and small businesses subject to the standards.

In a positive development, some SDOs have begun to create online reading rooms in which some IBR rules can be freely viewed. But readers must waive rights or even agree to indemnification and forum selection clauses to view the rules. Meanwhile, access is erratic, and SDOs uniformly reserve the right to revoke that access at will. For most citizens, travel to a Washington, D.C., reading room is not a viable alternative.

B. SDO Procedures

Private organizations that issue standards have widely variable processes, and federal law requires no particular procedures for the development of outside material that an agency incorporates by reference.²⁸ Circular No. A-119 does provide general criteria for the voluntary consensus standard that it encourages agencies to adopt. A voluntary consensus standard is one that comes from a "voluntary consensus standards bod[y]," which generally has the attributes of "[o]penness," "[b]alance of interest," "[d]ue process," and an "appeals process," together with the goal of "[c]onsensus," which means that the procedure must be designed to yield "general agreement, but not necessarily unanimity," including a "process for attempting to resolve objections by interested parties."²⁹ But these "voluntary consensus standards body" attributes are not actually required. Neither statute nor OMB policy appears to constrain an agency from incorporating a "nonconsensus standard"³⁰ or even includes a preference for a consensus standard.

As a practical matter, and notwithstanding Circular No. A-119's criteria, SDO processes vary widely. For example, at the API, whose standards are incorporated close to 280 times in the CFR,³¹ standards development is undertaken primarily by committee. While outsiders apparently may

participate, the organization requires a company name for application to participate, warns that travel is required, and states that it is advisable to have "your management's support in order to facilitate effective participation."³² At ASTM International, the SDO that has supplied the most incorporated standards to the federal government (close to 900 standards, incorporated over 2,000 times in the CFR³³), only members may participate in standards development; the lowest level of membership costs \$75 per year.³⁴ Further, although SDOs may strive to implement detailed internal processes for standards development and drafting, SDOs are not subject to the transparency requirements of the APA or FOIA's hearing or public comment requirements, because those statutes apply only to "agencies."³⁵

At best, then, full public access to SDO decisionmaking is limited, and even when such an organization's process is formally open to participation, it is often difficult to tell who participates in decisions. At worst, groups may be unrepresentative and decisionmaking closed. SDOs have been criticized as being dominated by regulated entities and, in particular, by the largest of those entities.³⁶ Further, perhaps obviously, SDOs are not bound by agency authorizing statutes; thus, they are under no obligation to prepare standards that meet statutory criteria.

Although federal agencies generally conduct notice-and-comment proceedings when incorporating a private standard, and this federal rulemaking process is open to the public at <http://www.regulations.gov>, this process is unlikely to fill potential gaps in SDO processes. APA rulemaking requirements call for an agency to publish a proposed rule and provide an opportunity for public comment before finalizing the rule.³⁷ An agency will typically state in a proposed rule that it plans to incorporate private material by reference, and the revised OFR rule requires the agency to summarize the material to be incorporated. Unfortunately, contrary to the practice with agency-drafted rules, the text the agency plans to incorporate is generally not included in the *Federal Register*. Instead, a putative public commenter is generally referred to the SDO for the text of the rule, subject to whatever restrictions the SDO imposes, including an access fee. Further, unlike federal agencies, private SDOs appear to be under no particular or consistent obligation to disclose the data underlying their standards to the public, undermining any meaningful public right to comment.³⁸

26. Draft Circular A-119 devotes only a single cursory paragraph to public access issues. See OFFICE OF MGMT. AND BUDGET, PROPOSED REVISIONS TO THE CIRCULAR, 10 (Feb. 10, 2014), available at <https://www.whitehouse.gov/sites/default/files/omb/inforeg/revisions-to-a-119-for-public-comments.pdf>.

27. 5 U.S.C. §552(a)(4)(A)(iv) (2012).

28. 5 U.S.C. §552(a) (2012).

29. CIRCULAR No. A-119, *supra* note 20, para. 4.

30. *Id.* at para. 6(g).

31. See Bremer, *supra* note 5, at 150.

32. See *Standards Committee Application*, AM. PETROLEUM INST., <http://www.api.org/publications-standards-and-statistics/standards-committee-application.aspx> (last visited Sept. 29, 2013).

33. See Bremer, *supra* note 5, at 150.

34. See *Technical Committees*, ASTM INT'L, <http://www.astm.org/COMMIT/newcommit.html> (last visited Sept. 29, 2013).

35. See 5 U.S.C. §551(a) (2012) (defining "agency"); *id.* §552 (applying information disclosure requirements to agencies); *id.* §553 (applying rulemaking requirements to agencies).

36. Jody Freeman, *The Private Role in Public Governance*, 75 N.Y.U. L. REV. 534, 641-42 (2000).

37. 5 U.S.C. §553(b)-(c) (2012).

38. *E.g.*, United States v. N.S. Food Prods. Corp., 568 F.2d 240, 251-52 (2d Cir. 1977).

Even after standards are incorporated, SDOs do not seem bound to continue making incorporated standards available at *any* price, even when they are referenced in and compose a portion of federally binding law. In fact, SDOs already have made some incorporated standards unavailable, likely undermining or even eliminating their enforceability.

II. Does Law Need to Be Public?

The IBR situation runs afoul of a widely shared intuition—that law created by the federal government needs to be meaningfully public. Public access issues around IBR rules have been less of a focal point compared with public access to a range of less broadly applicable, but more captivating, governmental decisions: say, wiretapping policy, or whether drone strikes can be used abroad (or domestically) to target American citizens who are suspected terrorists. Meanwhile, proponents of IBR rules have suggested that, despite the lack of access, agencies save significant resources by using these rules, and some citizens may not see them as terribly interesting or important because they are “technical.”³⁹ But these rules, which impact public health, safety, and the environment, are among the most far-reaching government actions. Meaningful public access is thus vital.

Understanding the importance of public access to these rules may matter immediately for several reasons. First, it could matter for purposes of legal reform by Congress, the executive branch, or the judiciary. Congress could simply require meaningful free public availability of all materials incorporated into federal rules, or it could expressly address the copyright and public access issues in another way.

Fully assessing why law needs to be public could affect executive reform decisions. The OFR could reform its IBR rules, or the OMB could revise Circular No. A-119 to emphasize public access.⁴⁰ Meanwhile, individual agencies could change their incorporation practices.

Further, IBR rules could face legal challenges under the APA and FOIA. One could argue that agency utilization of material for which SDOs charge access fees violates FOIA’s statutory requirement that incorporated materials be “reasonably available to the class of persons affected.”⁴¹ Any reasonable sense of the words “persons affected” would seem to encompass, depending on the subject area, large groups of consumers, employees in hazardous workplaces, and neighbors of natural gas pipelines.⁴² For such “affected” persons, the access fees charged may present a barrier that is far from “reasonable.”

A court might also hear arguments that a federal rule with incorporated private material for which access fees are charged violates the APA. The APA requires that an “inter-

ested person[]” be able to comment on a proposed rule and to petition to revise a final rule.⁴³ Commenting and petitioning are difficult, at best, when seeing the text of the rule requires either travel or a significant fee.

Finally, a more thorough assessment of the importance of ensuring meaningful access to federal rules is an opportunity to consider, more generally, why we need governmental transparency.

A. Transparency and Notice

The text of IBR materials needs to be readily and publicly accessible to give notice to those who must conform their conduct to the content of the standards. Regulated entities need to be able to learn their obligations easily.⁴⁴ Moreover, due process bars the imposition of sanctions on someone who could not have received notice of her obligations.⁴⁵ Small businesses charged with compliance have complained in comments filed with the OFR that the prices charged by SDOs are too high for them to apprise themselves of their obligations. SDOs can even make standards effectively unavailable by no longer offering them for sale.

Further, for regulatory regimes where incorporated standards are used, those standards also affect indirect regulatory beneficiaries, both individuals and entities. Congress enacts regulatory statutes specifically to guard wide swaths of the public. These range from the Safe Drinking Water Act and the Pipeline Safety Act to the Consumer Product Safety and Motor Vehicle Safety Acts.⁴⁶ The public can reasonably expect to benefit, including through helpful agency action.

Regulatory beneficiaries need notice of the content of regulatory standards because those standards can affect their choices of which toys or infant swings to buy, where to live, or whether to drink tap water. The content, not just the existence, of regulatory standards is important; a neighbor might view pipeline or drinking water standards, even if complied with, as inadequately protective. She still might choose to relocate or filter her water. If notice is to be effective, meaningful public access to the law’s content must be provided to anyone potentially affected, not just to those who must comply.

B. Accountability for Legislative and Quasi-Legislative Actions

In addition to the need for notice to both regulated entities and regulatory beneficiaries, IBR rules also need to be

39. See, e.g., Bremer, *supra* note 5, at 183.

40. Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities, 77 Fed. Reg. 19357 (Mar. 30, 2012).

41. 5 U.S.C. §552(a)(1).

42. E.g., Thompson v. N. Am. Stainless, LP, 562 U.S. 170, 178 (2011).

43. See 5 U.S.C. §553(c), (e); cf. United States v. N.S. Food Prods. Corp., 568 F.2d 240, 251-52 (2d Cir. 1977).

44. See Lawrence A. Cunningham, *Private Standards in Public Law: Copyright, Lawmaking and the Case of Accounting*, 104 MICH. L. REV. 291, 321 (2005).

45. See Christopher v. SmithKline Beecham Corp., 132 S. Ct. 2156, 2167-68 (2012) (refusing to defer to agency interpretation in view of “the principle that agencies should provide regulated parties ‘fair warning of the conduct [a regulation] prohibits or requires’”).

46. See, e.g., Mendelson, *supra* note 10, at 415.

readily and publicly available so that citizens can hold the government accountable both for complying with the law and for devising it, safeguarding against arbitrary conduct or “capture.” A lack of ready public access undermines the public’s ability to hold government accountable.

Consider the agency’s own decision whether to utilize the SDO standard at all. Even the most public-interested agency official⁴⁷ is likely to be interested in the significant resource savings from adoption of SDO rules, including rules that represent less-than-perfect implementation of the agency’s statutory commands.

Pragmatic political concerns, including reducing the resistance of regulated entities, also may nudge an agency to adopt a less-than-ideal SDO standard rather than draft a “government-unique” standard. If regulated entities are well-represented in Congress or in the White House as well as in the relevant SDO, an agency also might expect fewer hassles from political overseers.

Further, once an agency has developed a pattern of relying on privately generated standards, an agency may find it even harder to modify or reject those standards, because devising or locating replacement standards likely will be costlier than if the agency had well-established regulatory resources and staff of its own.⁴⁸

Ensuring that the agency is accountable for wisely choosing which IBR rules to adopt depends on meaningful public access to those rules. For agency rulemaking to serve as any sort of useful safeguard against poor standards when an agency elects to incorporate an SDO standard, the SDO standard and supporting data has to be meaningfully available during rulemaking, to ensure the participation of regulatory beneficiaries and ordinary citizens.

Other mechanisms for holding agencies accountable for their choice of IBR rules also depend on ready public access to those rules. The public might wish to seek congressional oversight or new statutes that more specifically direct agency action,⁴⁹ to register disapproval through voting, or to file a lawsuit seeking judicial review of the agency’s decision. Our current regime of limited public access to IBR rules undermines all these accountability mechanisms.

C. *The Distinctive Burdens Imposed by Access Prices for IBR Rules*

One could say that IBR rule prices pale next to costs, like legal fees, that can accompany lawsuits challenging agency rules. But readers also need access to the text of rules to inform compliance decisions, purchases, medical choices, letters to Congress or comments to agencies, and voting. These are not necessarily costly activities. Prices for IBR rules accordingly represent a distinct obstacle. Moreover, these access limitations are not random; they systemati-

cally exclude people based on budgetary constraints. Consumers and neighbors are likely to have smaller budgets relative to regulated manufacturers and pipeline operators. Regulated entities typically have an advantage, compared with the general public, in participating in policymaking, including in obtaining expert and legal technical assistance and in joining SDOs. Access costs may worsen this imbalance by keeping many consumers and neighbors from even getting in the door.

D. *Expressive Harm Imposed by Access Fees*

Having to pay a fee to read the law can obstruct individuals from learning their obligations, making informed decisions, or seeking governmental accountability. The government’s decision to regulate by incorporating expensive, difficult-to-locate standards also sends a damaging message to the public that may feed public cynicism regarding the openness and accountability of government.

Incorporating standards into law that are generally available only after paying a significant fee set by a private entity or traveling to Washington, D.C., contrasts starkly with the strong American tradition, since at least 1795, of widespread public access to the law. This tradition includes, for example, the use of depository libraries starting in the mid-1800s and the passage of the Federal Register Act of 1935, the Electronic Freedom of Information Act Amendments of 1996, and the e-Government Act of 2002.⁵⁰

When private organizations largely control access to the law, including the apparent power to curtail access to the text, this category of law, unlike federal statutes, other federal regulations, and federal court opinions, does not appear to be under public control. Even if only some citizens are effectively prevented from reading IBR standards, agencies are expressing a view fundamentally inconsistent with the strong Congressional policy of open access to the law. Limited access to IBR rules also undermines the First Amendment’s core value of free discussion of governmental affairs.⁵¹ This value undergirds the “right of the people to choose” governmental officials, directly or indirectly, in the electoral process.⁵²

III. *Permissible Reform Measures*

Given a fuller understanding of the reasons why law must be readily available to the public, reform of IBR standards is required. Any further legislative or administrative action on agency use of incorporated private standards should ensure permanent, widespread public availability of those standards. At a minimum, full access is needed

47. Cf. Sidney A. Shapiro, *Outsourcing Government Regulation*, 53 DUKE L.J. 389, 399 (2003).

48. *Id.* at 410-11.

49. See Jodi L. Short, *The Political Turn in American Administrative Law: Power, Rationality, and Reasons*, 61 DUKE L.J. 1811, 1821 (2012).

50. *E.g.*, Act of Feb. 5, 1859, ch. 22, §10, 11 Stat. 379, 381; Electronic Freedom of Information Act Amendments of 1996, Pub. L. No. 104-231, §4(7), 110 Stat. 3048, 3049; E-Government Act of 2002, Pub. L. No. 107-347, §§206(a)-(d), 207(f), 116 Stat. 2899, 2915-16, 2918-19 (codified as amended at 44 U.S.C. §3501 (2006) note (Federal Management and Promotion of Electronic Government Services)).

51. *Snyder v. Phelps*, 562 U.S. 443, 452 (2011).

52. See *United States v. Classic*, 313 U.S. 299, 314 (1941).

to ensure that all interested parties, including both regulated entities and regulatory beneficiaries, have appropriate notice of their legal liabilities and entitlements. Any reform should provide citizens with assured access during the entire period the SDO rule has been incorporated into federal regulatory law. That access ought to be provided in a centralized location that is easy for individuals to find. Such centralized access must be freely available through governmental depository libraries. Library access to hard copies could be provided, although it seems likely that most members of the public now rely on digital access.⁵³ Ideally, reform would provide access to IBR rules through text or direct links on the Government Printing Office and *Federal Register* websites, and additionally through federal agency websites.⁵⁴ Access should be through federally controlled websites to address a second critical barrier to public access—the enormous difficulty of locating IBR standards currently strewn over many different SDO websites.

Full digital access without charge, beyond what is available at governmental depository libraries, would place access to IBR standards on the same footing as other federal regulations. The current read-only access to these standards occasionally provided at the option of and only upon conditions set by SDOs is insufficient.

Nor is the OFR's regulatory approach adequate. OFR has missed an opportunity to speak directly to the level of public access required before language can be incorporated by reference into federal agency rules without *Federal Register* publication. A federal agency finalizing a rule must now "[d]iscuss" the way the agency "worked to make the materials . . . reasonably available," but this modest requirement for an agency statement contemplates OFR approval of agency use of an IBR rule that is not, in fact, "reasonably available."⁵⁵

An agency might have a number of options to ensure meaningful access to private IBR standards, other than permitting the SDO to set access charges.⁵⁶ For example, an agency could negotiate a license with an SDO to make IBR standards readily available to the public through a link on the *Federal Register* or CFR website. While this public availability may result in some revenue losses for SDOs, federal agency incorporation also can increase the demand for books of SDO standards. No-longer-current versions of SDO standards are sometimes priced higher than current versions simply because a federal agency has elected to incorporate the older one by reference.⁵⁷ Particularly in groups where regulated entities are well represented, the strong interest in influencing the content of the law may even motivate an SDO to agree to online public access

without further charge.⁵⁸ The fact that several SDOs have elected to make IBR standards available on a read-only basis on their own websites following the initiation of the OFR rulemaking supports the conclusion that agency negotiation of a price for incorporated standards may not be tremendously difficult or expensive.

In the case of an SDO that regularly supplies governmental standards, such as the National Fire Protection Association or the API, governmental contracting may also be an option. Besides resolving in favor of the government the question of who owns the copyright to material that ends up in federal rules,⁵⁹ contracting would also permit the agency to solicit bids to supply standards, thus increasing competition among groups to do so and enabling the agency to specify more open and accessible processes for standards development.⁶⁰ For an SDO who is unwilling to sign such a contract or to negotiate to provide public access as a condition of incorporation, a federal agency intent on incorporating a publicly accessible standard would face a choice between drafting a government-unique standard or using compulsory licensing provisions.⁶¹

What should be out of bounds? Any proposal that continues to rely primarily on SDOs for public access, so that the SDOs can condition access on the payment of fees or revoke it altogether.⁶² Reforms must assure that groups currently underrepresented in agency and SDO processes have access to the text of these rules—and thus have a chance at participating in standards development and at invoking mechanisms of accountability. The best approach would be a straightforward one that provides free, easy-to-locate online access to the entire public.⁶³

Any charge, even a small fee, could obstruct access to the poor or those who seek access to multiple standards, and it would still communicate a message of hostility to core democratic values. These standards should be publicly available in the same manner as other federal regulatory standards—for free in governmental depository libraries and, ideally, through the Government Printing Office and agency websites as well.

IV. Conclusion: On Public Access

These over 9,000 IBR rules, covering areas ranging from infant seat safety to pipeline operation, are published ad hoc in numerous locations and are hard to locate, even when federal agencies provide SDO contact information in the CFR. Of even greater concern, public access to these standards is primarily through private organiza-

53. Comment of Michael Herz, Sec. Chair, Section of Admin. Law & Regulatory Practice, Am. Bar Ass'n 11 (OFR Docket June 1, 2012), available at <http://www.regulations.gov/contentStreamer?objectId=0900006481025ea5&disposition=attachment&contentType=pdf>.

54. Bremer, *supra* note 5, at 179.

55. Incorporation by Reference, 78 Fed. Reg. 60784, 60797 (revision to 1 C.F.R. §51.5(a)(1), proposed Oct. 2, 2013).

56. *E.g.*, Cunningham, *supra* note 44, at 338-41.

57. *E.g.*, Strauss, *supra* note 19, at 509-10.

58. See Comment of R. Bruce Josten, Exec. Vice President of Gov't Affairs, Chamber of Commerce of the U.S. 1 (OFR Docket Apr. 3, 2012), available at <http://www.regulations.gov/contentStreamer?objectId=0900006480feb794&disposition=attachment&contentType=pdf>.

59. See Rights in Data—General, 48 C.F.R. §52.227-14(b) (2012).

60. See Strauss, *supra* note 19, at 544-45.

61. See Cunningham, *supra* note 44, at 332.

62. See, *e.g.*, Bremer, *supra* note 5, at 180-82.

63. Comment of Ronald E. Jarnagin, President, ASHRAE 4 (OFR Docket Mar. 30, 2012), available at <http://www.regulations.gov/contentStreamer?objectId=0900006480fe4f56&disposition=attachment&contentType=pdf>.

tions empowered to charge significant fees and, effectively, to revoke access. With IBR rules, the public's access is impaired disproportionately based on income.

Access must be generally available to both regulated entities and the intended beneficiaries of legislation. If those burdened with obligations cannot learn their substance without paying hundreds of dollars to an SDO or traveling to Washington, D.C., the law is not meaningfully public.

Federal regulatory actions apply to the entire public—broadly and for an indefinite duration. These legislative or quasi-legislative actions are among the most significant powers exercised by the federal government. Access to the text of these rules cannot just be a formality; the text must be readily, meaningfully available to the public, including substantial levels of public access without charge. Increased transparency in the form of meaningful public access is the bare minimum for accountability.

C O M M E N T

A Multidimensional Problem

by Emily S. Bremer

Emily S. Bremer is the Research Chief of the Administrative Conference of the United States. The views expressed here are those of the author and do not necessarily reflect those of the Administrative Conference, its committees, or its members.

Federal agencies often give legal effect to privately developed standards by incorporating them by reference in regulations. The practice, though obscure, is longstanding. The provision of the Freedom of Information Act (FOIA) that permits the incorporation by reference of “matter reasonably available to the class of persons affected thereby” was enacted in 1966.¹ And agencies’ incorporation by reference of voluntary consensus standards gives effect to a federal standards policy that emerged in the late 1970s,² was first embraced by the Executive in 1982,³ and was partially codified by Congress in the National Technology Transfer and Advancement Act of 1995.⁴

The difficulty is that the standards are not as freely available and easy to find as the regulations into which they are incorporated. The private, nonprofit organizations that develop standards typically assert copyright to them and rely on the revenue generated by their sale to fund the standards development process.⁵ In 2011, the Administrative Conference of the United States recommended that agencies should work with standards developers and other copyright holders and use electronic tools such as read-only access to expand the free online availability of incorporated materials.⁶ The Office of the Federal Register (OFR) and the Office of Management

and Budget (OMB) have recently taken steps to encourage and support agency implementation of this collaborative approach.⁷

In *Taking Public Access to the Law Seriously: The Problem of Private Control Over the Availability of Federal Standards*, Professor Nina Mendelson has done a great service, offering a strong and comprehensive argument for “why law needs to be public.”⁸ This comment and the Administrative Conference’s recommendation also agree that the policy goal should be to make incorporated materials freely available online.⁹ Where we part ways is with respect to the solution. Focusing exclusively on the public access dimension of the incorporation by reference conundrum, Professor Mendelson concludes that any solution relying on collaboration with private standards developers “should be out of bounds.”¹⁰ But the problem has several other dimensions—interests, both public and private, that must be considered if one is to design a policy that is workable and avoids unintended, negative consequences.¹¹ Viewed from this perspective, public-private collaboration emerges as the policy prescription with the greatest promise. And there is substantial evidence that it is already working.

I. The Significant Private Role in Standardization

To begin, the problem of public access to incorporated standards must be understood within the context of the

1. 5 U.S.C. §552(a)(1); see Act of July 4, 1966, Pub. L. No. 89-487, 80 Stat. 250. Although this comment focuses on standards, agencies also incorporate many other kinds of materials by reference in regulations. See Emily S. Bremer, *Incorporation by Reference in an Open-Government Age*, 36 HARV. J.L. & PUB. POL’Y 131, 145-47 (2013) [hereinafter Bremer, *Incorporation by Reference*].
2. See Admin. Conference of the U.S., Recommendation 78-4, Federal Agency Interaction With Private Standard-Setting Organizations in Health and Safety Regulation, 44 Fed. Reg. 1357 (Jan. 5, 1979); Robert W. Hamilton, *The Role of Nongovernmental Standards in the Development of Mandatory Federal Standards Affecting Safety or Health*, 56 TEX. L. REV. 1329, 1379-86 (1978).
3. See Federal Participation in the Development and Use of Voluntary Standards, 47 Fed. Reg. 49496 (Nov. 1, 1982).
4. See Pub. L. No. 104-113, §12(d), 110 Stat. 775 (1996), available at <http://www.nist.gov/standardsgov/ntaa-act.cfm>.
5. See Emily S. Bremer, *On the Cost of Private Standards in Public Law*, 63 U. KAN. L. REV. 279, 279 (2015) [hereinafter Bremer, *On the Cost*].
6. See Recommendation 2011-5, Incorporation by Reference, 77 Fed. Reg. 2257, 2257 (Jan. 17, 2012), available at <https://www.acus.gov/recommendation/incorporation-reference>. I served as the Conference’s in-house researcher on this recommendation. See Bremer, *Incorporation by Reference*, *supra* note 1, at 131 n.*.

7. See Request for Comments on a Proposed Revision of OMB Circular No. A-119, “Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities,” 79 Fed. Reg. 8207 (Feb. 11, 2014). The proposed revisions were not printed in the *Federal Register*, but are available on OMB’s website at THE WHITE HOUSE, <http://www.whitehouse.gov/sites/default/files/omb/inforeg/revisions-to-a-119-for-public-comments.pdf> (last visited Dec. 20, 2014); see also 159 CONG. REC. H4499 (daily ed. July 16, 2013) (statement of Rep. Eddie Bernice Johnson) (identifying collaboration as a preferable approach).
8. Nina A. Mendelson, *Taking Public Access to the Law Seriously: The Problem of Private Control Over the Availability of Federal Standards*, 45 ELR 10776, 10777 (Aug. 2015), originally published as Nina A. Mendelson, *Private Control Over Access to the Law: The Perplexing Federal Regulatory Use of Private Standards*, 122 MICH. L. REV. 737, 748 (2014).
9. See Recommendation 2011-5, 77 Fed. Reg. at 2258-59.
10. Mendelson, *Private Control*, *supra* note 8, at 802.
11. See Bremer, *On the Cost*, *supra* note 5, at 283-96.

larger, predominantly private standards development system that has prevailed in the United States for over a century.¹² Beginning in the late 1800s and early 1900s, private technical committees emerged to address the extraordinary standardization needs of, first, the Industrial Revolution and, later, the World Wars. Collaboration between the government and these private organizations also emerged early on, and was particularly spurred on by the enormous standardization required to support the war effort. Viewed within this historical context, the current federal standards policy “is best understood as merely the most recent and prominent extension of a larger and more deeply rooted commitment to private standards development” and public-private collaboration.¹³

Today, the private standards system is significantly larger than the sphere of federal regulation. Two points of public-private comparison illustrate. First, although there are well over 100 federal agencies,¹⁴ these are far outnumbered by the more than 600 private standards development organizations.¹⁵ Second, the number of private standards incorporated by reference in federal regulations represents only a very small percentage of the more than 100,000 private standards estimated to be in use throughout the United States.¹⁶ As of May 13, 2015, the Standards Incorporated by Reference (SIBR) Database, which is maintained by the National Institute of Standards, a component agency of the Department of Commerce, identified 12,486 incorporations by reference of standards in the Code of Federal Regulations (CFR).¹⁷ This is likely a significant overestimate of the actual number of private, incorporated standards. After all, the database counts *incorporations by reference* of standards, not *standards* themselves, and it includes incorporations of government-unique standards.¹⁸ Moreover, many agencies incorporate the same standard in different provisions of the CFR, and it is also very common for agencies to incorporate by reference different versions of the same standards in different provisions of the CFR. A case study of standards incorporated by reference in pipeline safety regulations revealed that, although 73% of those standards were created by only three organizations, those standards represented just a small fraction

(one-tenth of 1%, 2%, and 3.7%) of each organization’s overall standards portfolio.¹⁹

A good estimate, then, is that only about 2-4% of all private standards are incorporated by reference into federal regulations. This powerfully illustrates the continued significance of the longstanding private role in standardization. In this light, it is difficult to see how the public access problem can be solved unilaterally by government and without substantial public-private collaboration.

II. A Multidimensional Problem

Finding a way to make incorporated standards freely available online is challenging because the problem is a multidimensional. Public access to the law is just one relevant imperative. From a practical perspective, an agency seeking to facilitate free access to its incorporated standards must find a way to achieve that outcome without: (1) abdicating its statutory responsibilities (e.g., to protect public health and safety); (2) infringing the copyrights of standards development organizations; or (3) violating federal standards policy. In other words, the public access problem implicates a variety of interests that must all be considered and balanced.

An important consideration is the potential implications for public health and safety if an agency is prohibited from using certain standards solely because those standards are not freely available online. In many instances, the technically superior, authoritative standard is a private standard. Preventing an agency from using that standard may undermine its ability to fulfill its regulatory mission. A good example is found in the pipeline safety context, where in early 2012, Congress imposed an uncompromising free access mandate on the Pipeline and Hazardous Materials Safety Administration (PHMSA).²⁰ The agency worked diligently for over a year and a half to negotiate free access agreements with all of its standards developers.²¹ In the end, however, it was unable to secure free online access to some of its most important and expensive standards, including several sections of the American Society of Mechanical Engineers’ (ASME) Boiler and Pressure Vessel Code.²² Recognizing the threat to public safety, Congress swiftly amended the law to give PHMSA the flexibility it needed to carry out its core statutory mission.²³

The copyright dimension of the public access problem plainly implicates the private interests of standards developers, but it also implicates a few less obvious public interests. Standards development is expensive. If the non-profit organizations that develop standards cannot recoup

12. See Bremer, *Incorporation by Reference*, *supra* note 1, at 139-41.

13. Bremer, *On the Cost*, *supra* note 5, at 299.

14. See DAVID E. LEWIS & JENNIFER L. SELIN, SOURCEBOOK OF UNITED STATES EXECUTIVE AGENCIES (Admin. Conf. of the U.S. ed., 2d ed. 2013); see also VANDERBILT UNIV., CTR. FOR THE STUDY OF DEMOCRATIC INSTS., SOURCEBOOK OF UNITED STATES EXECUTIVE AGENCIES, available at <http://www.vanderbilt.edu/csdi/Sourcebook12.pdf>.

15. See U.S. DEPT. OF COMMERCE, STANDARDS & COMPETITIVENESS: COORDINATING FOR RESULTS 5 (May 2004), available at <http://ita.doc.gov/td/standards/pdf%20files/Standards%20and%20Competitiveness.pdf>.

16. E-mail from Scott P. Cooper, Vice President of Gov’t Relations, Am. Nat’l Standards Inst., to author (June 11, 2013) (on file with author).

17. NAT’L INST. FOR STANDARDS & TECH., REGULATORY SIBR (P-SIBR) STATISTICS, STANDARDS INCORPORATED BY REFERENCE DATABASE, https://standards.gov/sibr/query/index.cfm?fuseaction=rsibr.total_regulatory_sibr (last visited May 13, 2015) [hereinafter P-SIBR STATISTICS].

18. For example, the U.S. Environmental Protection Agency is identified as the third largest contributor of incorporated standards. See P-SIBR STATISTICS, *supra* note 17.

19. See Bremer, *On the Cost*, *supra* note 5, at 306-07.

20. See Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011, Pub. L. No. 112-90, §24, 125 Stat. 1904, 1919 (codified at 49 U.S.C. §60101 (2012)).

21. See Bremer, *On the Cost*, *supra* note 5, at 323-26.

22. See *id.* at 327-29.

23. See Availability of Pipeline Safety Regulatory Documents, Pub. L. No. 113-30, 127 Stat. 510 (2013).

the costs through copyright, they must find an alternative revenue model.²⁴ Each alternative has its own downsides. Charging more for membership or participation in the standards development process would make it harder for small businesses, public interest advocates, and academics to participate, undermining decades of effort to make the process more balanced and inclusive.²⁵ Relying more heavily on donations could imperil the standards developers' independence by giving large donors greater leverage to influence the standards development process with threats to withdraw needed financial support. Having government pay for free online access (which would necessarily be available to all users of a standard around the world) would be prohibitively expensive, particularly in these times of budget austerity.²⁶

Finally, any solution to the public access problem should preserve the longstanding and highly valuable public-private partnership in standardization. Federal agency use of private standards in regulation reaps many public benefits. It saves agencies time and money and allows them to capitalize on the substantial technical expertise that exists outside government.²⁷ More crucially, it enables federal regulators to integrate regulatory regimes with the much larger universe of private standards.²⁸

III. Public-Private Collaboration Can Work

Public-private collaboration offers the greatest promise for achieving the ideal of free online access to incorporated standards without sacrificing these diverse values and interests. And there is substantial evidence that it can work. Several of the largest U.S. standards developers, including the National Fire Protection Association and ASTM International, have created online standards libraries designed to provide the public with free access to incorporated standards.²⁹ The American National Standards Institute (ANSI) recently created an online standards portal that allows smaller standards developers to offer free public access without incurring the substantial costs of building the necessary IT infrastructure.³⁰ In the pipeline safety case study, standards developers offered free online access to approximately 66% percent of PHMSA's incorporated standards independently of the agency's efforts to implement the short-lived free access mandate.³¹

Any policy must be evaluated based on its demonstrated effectiveness in achieving a desired outcome. An approach that looks great on paper may prove unworkable in practice. PHMSA's experience suggests that a bald free access mandate is one such simple, uncompromising, and unworkable approach to the free access problem. In contrast, the collaborative approach, although necessarily incremental, provides the flexibility necessary to accommodate the demands of this difficult, multidimensional problem.

24. See Bremer, *Incorporation by Reference*, *supra* note 1, at 176-77.

25. See OFFICE OF MGMT. & BUDGET, CIRCULAR NO. A-119 REVISED: FEDERAL PARTICIPATION IN THE DEVELOPMENT AND USE OF VOLUNTARY CONSENSUS STANDARDS AND IN CONFORMITY ASSESSMENT ACTIVITIES, 63 Fed. Reg. 8546 (Feb. 19, 1998), available at https://www.whitehouse.gov/omb/circulars_a119.

26. See Bremer, *Incorporation by Reference*, *supra* note 1, at 177.

27. See *id.* at 139-41.

28. See Bremer, *On the Cost*, *supra* note 5, at 306-09.

29. See, e.g., *Free Access*, NAT'L FIRE PROT. ASS'N, <http://www.nfpa.org/codes-and-standards/free-access>; *Reading Room*, ASTM INT'L, <http://www.astm.org/READINGLIBRARY/>. Accessing the standards typically requires users to register and agree to certain terms and conditions. There are reasonable explanations for why standards developers have taken these steps to protect their copyrights, including a desire to avoid any apparent waiver of rights that are now at issue in long anticipated copyright litigation, see, e.g., *Complaint, Am. Educ. Research Ass'n et al. v. Public.Resource.org, Inc.*, (D.D.C. 2014) (No. 14-857); *Complaint, Am. Soc'y for Testing & Materials, Inc. et al. v. Public.Resource.org, Inc.*, (D.D.C. 2013) (No. 13-1215), as well to account for the possibility that efforts to voluntarily meet the public need for access will threaten the continued financial viability of the standards development process.

30. See *ANSI Launches Online Portal for Standards Incorporated by Reference*, ANSI (Oct. 28, 2013), http://www.ansi.org/news_publications/news_story.aspx?menuid=7&articleid=e6e2ff18-d2fd-4886-91f4-fcbcf5b9d145.

31. See Bremer, *On the Cost*, *supra* note 5, at 316, 326.

C O M M E N T

Comments on Taking Public Access to the Law Seriously

by Lois Schiffer

Lois Schiffer is General Counsel for the National Oceanic and Atmospheric Administration (NOAA).

Professor Mendelson's article is extremely important. Although I have worked on federal regulations and environmental law for over 40 years, until I read Professor Mendelson's article I had not focused on this critical issue. The idea that the government has a body of law that the public cannot access for free is quite startling from the perspective of the enforceability of federal rules, government transparency, and public access to material that may bind the public. It also raises serious questions about basic due process and fairness.

I am in complete agreement with Professor Mendelson. If the government is going to use privately-developed standards as part of its rules, it is important that the public can review the standards and participate in those rules. I may go further than Professor Mendelson in adding that in order for there to be meaningful public comment, the government should make it a component of its use of private standards that the standards-developing entity maintain an adequate record and that the public has an opportunity to review the standard.

For example, while I certainly can understand that the tensile strength of a pipe might not be riveting to many, someone somewhere is making an assumption about how protective the standard is going to be, the nature of that strength, and what kind of testing is required. If people who will be bound by the proposed regulation want to understand the standard and comment on the draft regulation but they do not have free access to the standard and what underlies it, I do not know how their comments can be meaningful. In addition, the idea that most interested parties will have the resources to buy private standards is problematic. It is the rare public rule that does not have a wide range of interested parties. In fact, I am surprised

Author's Note: This Comment is based on a transcript of Ms. Schiffer's remarks at the April 10, 2015 Environmental Law and Policy Annual Review conference in Washington, D.C. The views expressed here are Ms. Schiffer's own and not those of NOAA or the Department of Commerce.

there have not been more legal challenges to the use of private standards in federal regulations, especially if the standards are not publicly available for free.

I would like to suggest a glimmer of hope for remedying the problem of public access to private standards—an approach that arises in a different context. Specifically, in February 2013, the Office of Science and Technology Policy (OSTP) in the White House issued a policy that builds on the U.S. Open Data Policy.¹ The OSTP policy seeks to increase public access to federally-funded research results. The idea is that if federal money pays for research, then the public should have access to the research—preferably for free.

Federal agencies are expected to develop their own policies for making this research publicly available. The core principle in the NOAA policy is that publications and environmental data funded through taxpayer dollars will be made publicly accessible in a timely fashion.² In the case of articles published by limited access journals—journals that are similarly situated to standards issued by private organizations because their work is funded by people who purchase their products—efforts are underway to figure out how that information can be made available for free. For example, this could include embargoing the research results so that the journal could sell its product for the first 12 months, after which the research results would be publicly available—or it could be through other methods yet to be developed.

I raise public access to research results as an analogue, because the policy makes very clear that when government activity uses material to which the public really needs to have access, the government is beginning to think

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1. Memorandum from John P. Holdren, Dir., Office of Sci. & Tech. Policy, Exec. Office of the President (Feb. 22, 2013), available at https://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf.
 2. NAT'L OCEANIC & ATMOSPHERIC ADMIN., NOAA PLAN FOR INCREASING PUBLIC ACCESS TO RESEARCH RESULTS (Feb. 2015), available at http://docs.lib.noaa.gov/noaa_documents/NOAA_Research_Council/NOAA_PARR_Plan_v5.04.pdf.

about and figure out ways to make that happen. Professor Mendelson's article highlights the importance of similar arrangements for publicly-adopted private standards. In such cases, it is not because taxpayer dollars are at stake, but because even more crucial principles—fundamental fairness and constitutional due process—come to bear that we must figure out ways to make sure the public has free, quick and available access. Whether that means the gov-

ernment pays the licensing fee to the private entity or other means are used to make sure the material is publicly available should be worked out, because the idea that the public is required to comply with the law but cannot see what the law is goes against every concept of due process.

Accordingly, I am very glad Professor Mendelson wrote this article and highlighted a fundamental problem that needs to be addressed.

A R T I C L E

Public Utility and the Low-Carbon Future

by William Boyd

William Boyd is an Associate Professor, University of Colorado Law School and a Fellow, Renewable and Sustainable Energy Institute.

Substantial reductions in global power sector emissions will be needed by midcentury to avoid significant disruption of the climate system. Achieving these reductions will require greatly increased levels of financing, technological innovation, and policy reform. In the United States, the scale and complexity of the overall challenge have raised important questions regarding prevailing regulatory and business models, with much scrutiny directed at the traditional practice of public utility regulation. Recognizing the many valid criticisms leveled against public utility regulation and the important questions raised about the viability of traditional utility business models, particularly in the face of substantial growth in distributed energy resources, this Article argues that a revitalized and expanded notion of public utility has a critical role to play in efforts to decarbonize the power sector in the United States.

In making this argument, the Article reaches back to earlier understandings of public utility as elaborated by Progressive lawyers, legal realists, and institutional economists during the first half of the 20th century. Public utility, in their view, was a distinctively American approach to the “social control of business”—a third way between unregulated markets and outright public ownership that promised to harness the energy of private enterprise and direct it toward public ends.¹ As such, it was first and foremost a normative effort to ensure that the governance of essential network industries, such as electric power, would protect the public from the abuses of market power by providing stable, reliable, and universal service at just and reasonable rates.

Viewed in this broader context, public utility is not a thing or a type of entity but an undertaking—a collective project aimed at harnessing the power of private enterprise and directing it toward public ends. While the traditional utility business model represents an important manifes-

tation of public utility, it hardly exhausts the category. It would be a mistake, therefore, to presume that there is only one right way to organize and regulate the power sector within the broad framework of public utility.

As this Article shows, the broader concept of public utility gave way to a much thinner understanding during the 1970s in response to a series of external challenges and a sustained intellectual assault mounted by economists and lawyers. The diminished notion of public utility that resulted has, it is argued, distorted our views regarding the role of markets and disruptive technologies in the power sector, particularly in efforts to promote low-carbon electricity.

A more expansive and revitalized understanding of public utility is essential to motivate and organize the planning and investment needed to decarbonize the power sector by midcentury, to coordinate and administer a grid capable of integrating substantial amounts of intermittent renewable generation and distributed energy resources, and to facilitate experimentation and innovation at scale. The transition to a low carbon electricity system over the coming decades can only be realized if it is seen as a collective, political choice that aligns technologies, business models, and regulatory frameworks in a manner that capitalizes upon the positive network effects of an increasingly integrated and participatory electric power grid.

I. Electric Power and the Climate Change Challenge

The U.S. electric power system is the largest in the world.² It joins a diverse array of generation assets with high-voltage transmission lines, local distribution systems, and, increasingly, active demand-side and distributed resources to deliver a highly reliable service to millions of households and businesses in a manner that must precisely balance generation (supply) and load (demand) in real-time. It is also the largest single source of greenhouse gas (GHG)

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1. See, e.g., JOHN MAURICE CLARK, *SOCIAL CONTROL OF BUSINESS* (1926).

2. See MIT, *THE FUTURE OF THE ELECTRIC GRID* 1 (2011).

emissions in the United States, accounting for a third of total U.S. GHG emissions in 2012.³

Multiple scenarios have been developed to understand the possible future makeup of a decarbonized power sector in the United States. Regardless of the ultimate mix of technologies and resources, realizing a low-carbon future will require greatly enhanced levels of planning, investment, and coordination across multiple scales.

A. *Energy System Momentum and Committed Emissions*

Two concepts help to elucidate the challenge of decarbonizing the electric power sector: energy system momentum and committed emissions. Energy system momentum recognizes that the long-lived, relation-specific assets involved in electricity generation, transmission, and distribution, combined with the institutional and regulatory frameworks that govern the use of these assets, result in a system with considerable inertia.⁴

Committed emissions recognizes that these assets (and the system as a whole) have embedded within them a significant amount of future GHG emissions.⁵ While it is possible that some of these assets will be retired early or retrofitted in a manner that changes their emissions profile,⁶ it is clear that there are substantial committed emissions in the current system and that the investment decisions made today will strongly influence the industry's emissions profile for decades to come.

Careful planning and sequencing of investments in various segments of the industry will be necessary to create an electric power system that has a vastly reduced emissions profile compared to the current system. Even with a price on carbon, wholesale power markets alone may not be able to deliver the proper incentives. Waiting for disruptive technologies to emerge and deploy on a large scale is also problematic given the complexity of the system and the challenges of rapidly integrating large amounts of renewable energy, demand response, and distributed generation.

B. *Distinctive Features of Electric Power*

The electric power system is a complex, highly interdependent network that operates on multiple time scales, ranging from milliseconds to years.⁷ Because electricity cannot

be stored on any significant scale, cannot be directed (as in the case of classic switched networks), and because generation and load must be balanced in real time, sophisticated systems operation capabilities are necessary to ensure continuous delivery of reliable electric service.⁸

These facts make it difficult to design markets for electricity, which require carefully designed dispatch algorithms and auctions and are vulnerable to the exercise of market power.⁹ They also pose challenges to integrating large amounts of intermittent non-dispatchable renewable resources, demand response, and other distributed energy resources such as rooftop solar and storage. In all of these cases, balancing resources are needed to compensate for intermittency and to maintain frequency. One of the many promises of a more intelligent grid is to enable more careful and precise systems operation. As the complexity of the grid increases—with more actors buying and selling power, more renewables, more demand response, more storage, and more distributed generation—the importance of systems operation only grows.

In this respect, it is sometimes useful to think of electricity as less of a commodity and more of an infrastructure—a system of provisioning that allows energy services to be made available to those connected to the grid, thereby providing a platform for other forms of economic activity.¹⁰ The increase in distributed energy resources allows households and businesses to be more active participants in that infrastructure. This requires significant increases in system-wide flexibility that, if managed appropriately, could allow for high penetration of variable renewable sources. It also deepens rather than diminishes the collective nature of the system, as passive consumers become more active participants on the grid.

C. *Institutional and Regulatory Diversity*

Roughly speaking, three major models compose the current electric power system in the United States: (1) the fully restructured model (Texas and the Northeast), which combines wholesale power markets managed by independent system operators (ISOs) with retail electric competition in individual states; (2) the traditional cost-of-service model (the Southeast and much of the West), in which vertically integrated investor-owned utilities (IOUs) provide service to captive customers through regulated monopoly franchises; and (3) a hybrid model (the rest of the country), which combines wholesale power markets managed by

3. See U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2012, at ES-23 (2014).

4. See THOMAS P. HUGHES, NETWORKS OF POWER: ELECTRIFICATION IN WESTERN SOCIETY, 1880-1930, at 15-16, 140, 465 (1983).

5. See Steven J. Davis et al., *Future CO₂ Emissions and Climate Change From Existing Energy Infrastructure*, 329 SCIENCE 1330, 1330 (2010).

6. See U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2014, at IF-34-IF-38 (2014) [hereinafter ANNUAL ENERGY OUTLOOK 2014].

7. See ALEXANDRA VON MEIER, ELECTRIC POWER SYSTEMS: A CONCEPTUAL INTRODUCTION 260-68 (2006).

8. See *id.* at 8.

9. See *id.* at 295.

10. See Harry M. Trebing, *On the Changing Nature of the Public Utility Concept: A Retrospective and Prospective Assessment*, in ECONOMICS BROADLY CONSIDERED: ESSAYS IN HONOR OF WARREN J. SAMUELS 258, 269 (Jeff E. Biddle et al. eds., 2001).

ISOs with retail service provided by IOUs through regulated monopoly franchises.¹¹

One advantage of this diversity is the opportunity for policy innovation. Contrary to the standard view of utility regulation as static, reactive, and unimaginative, both the Federal Energy Regulatory Commission (FERC) and a number of state public utility commissions (PUCs) have been quite active in developing new policies to facilitate various low-carbon technologies and practices and to modernize the grid. PUCs, for example, have used a range of tools to channel investments across a portfolio of generation resources, including low-carbon alternatives; have adjusted tariff structures to facilitate conservation, efficiency, demand response, and distributed generation; and have experimented with efforts to modernize local distribution systems. At the same time, FERC, together with the regional transmission organizations (RTOs) and ISOs, has pursued important and innovative initiatives in the organized wholesale markets, including efforts to integrate variable renewable resources, promote demand response, and facilitate long-term regional transmission planning and cost allocation.¹² Rather than seeing the diversity of institutional forms and regulatory structures as a liability, then, it seems more productive to view it as a source of new ideas and practices.

D. The Challenge of Decarbonization

Efforts to decarbonize the electric power sector are proceeding along multiple pathways, with many possible scenarios regarding the future organization of the system. Although there is no consensus on what such a system will or should look like, several recent studies have identified as a benchmark an 80% reduction of power-sector GHG emissions by 2050.¹³ While some envision a large build-out of utility-scale renewables and other forms of low-carbon generation to replace the current fleet of centralized, fossil-generating plants,¹⁴ others see a more distributed scenario with both residential and nonresidential customers increasingly embracing rooftop solar and other forms of distributed generation integrated into the grid through a system of advanced meters and a more intelligent distribution system.¹⁵ Virtually all scenarios focus on the significant potential of efficiency and demand response to reduce or flatten out load curves and thus avoid building new generation.¹⁶

Future organization of a low-carbon power sector will probably include a mix of utility-scale generation based on

renewables, nuclear, and fossil fuels with carbon capture and storage, together with increasing penetration of distributed generation, demand response, and storage. The complexity associated with efforts to integrate an increasingly diverse, and in many cases variable, set of resources will only increase.

Building a low-carbon electric power system will also require enormous investment. Any effective institutional framework for managing this transition will thus need to mobilize substantial amounts of capital. It also seems likely that the resulting system will have a higher capital intensity than the current system. On the generation side in particular, renewables, nuclear power, and fossil generation with carbon capture and storage are all more capital-intensive (that is, they have a higher fixed to variable cost ratio) than the current fleet of coal and gas plants, in which a substantial share of the cost of electricity is driven by fuel costs. This increases the relative importance of the cost of capital, which puts a premium on stability of future revenues to ensure cost recovery and thereby keep financing charges down. All of which raises questions about the viability of current electricity market designs to incentivize the proper levels of investment.

II. Changing Conceptions of Public Utility

Investigating the relevance of the public utility concept for efforts to decarbonize the power sector requires understanding how the concept has changed over time. Earlier conceptions of public utility, as articulated most forcefully by Progressive lawyers and legal scholars, legal realists, and institutional economists in the early twentieth century, were part of a broader agenda founded on the notion that certain types of businesses should be subject to regulation in the public interest, that competition should be viewed as a tool rather than an end state, and that the entire undertaking of public utility regulation should be considered experimental and open to new pathways and possibilities. Most importantly, public utility was seen as a common, collective enterprise aimed at managing a series of vital network industries that were too important to be left exclusively to market forces.

Although these early proponents of public utility were well aware of the problems manifest in the actual practice of utility regulation, their criticisms were never intended as a wholesale assault on the concept itself. During the 1960s and 1970s, however, a number of economists and economically minded lawyers did mount such an assault on the concept. Their critique, along with the challenges to public utility regulation that stemmed from the exhaustion of economies of scale in generation, the prolonged energy crisis of the 1970s, and rising environmental concerns, resulted in a much narrower conception of public utility. This diminished understanding of public utility provided much of the conceptual and normative framing for efforts to deregulate the sector in the 1990s as well as more recent arguments by the proponents of distributed generation and other potentially disruptive technologies that the time has come to abandon the traditional utility business model. On

11. For a map of current regional transmission organizations (RTOs) and independent system operators (ISOs), see *Regional Transmission Organizations*, FED. ENERGY REG. COMMISSION, <http://www.ferc.gov/industries/electric/industry/rto.asp> (last updated Jan. 5, 2015).

12. See, e.g., FERC Order No. 764, *Integration of Variable Energy Resources*, 77 Fed. Reg. 41482 (July 13, 2012) (codified at 18 C.F.R. pt. 35).

13. See AMORY B. LOVINS & ROCKY MOUNTAIN INST., *REINVENTING FIRE: BOLD BUSINESS SOLUTIONS FOR THE NEW ENERGY ERA* 169 (2011) [hereinafter *REINVENTING FIRE*].

14. See, e.g., NAT'L RENEWABLE ENERGY LAB., *RENEWABLE ELECTRICITY FUTURES STUDY: EXECUTIVE SUMMARY* iii (M.M. Hand et al. eds., 2012) [hereinafter *RENEWABLE ELECTRICITY FUTURES STUDY*].

15. See *REINVENTING FIRE*, *supra* note 13, at 202-11.

16. See, e.g., *RENEWABLE ELECTRICITY FUTURES STUDY*, *supra* note 14, at 23.

closer inspection, however, this narrowed understanding does not comport with the current makeup and trends in the electric power sector. Nor does it provide an adequate basis for planning and executing substantial decarbonization by midcentury.

A. Public Utility, Public Interest, and Social Control of Business

By 1930, every state but Delaware had a public utility statute that charged some type of administrative entity with responsibility for regulating public utilities such as water, gas, and electricity.¹⁷ Statutory mandates were typically broad and open-ended, founded on the goal of ensuring that rates were just, reasonable, and nondiscriminatory in order to strike the appropriate balance between ratepayers and investors.¹⁸ Public utility regulation provided a means for utilities to secure capital at lower cost and to channel it into very large technological systems.¹⁹ In return for an exclusive franchise, the right of eminent domain, and an ability to sell electricity at reasonable rates, electric utilities would provide reliable, universal service and forgo some of the profits that might be attainable in the absence of regulation.²⁰ Regulation of these private enterprises was therefore seen, at least in part, as an antidote to the market failures that were associated with the natural monopoly characteristics of these industries.

It is important to emphasize here, however, that the underlying concept of public utility as advanced by Progressives, legal realists, and institutional economists during the first half of the 20th century had certain features that transcended the problems of practical application, providing a basis for new pathways and possibilities. Specifically, these lawyers and economists saw public utility less as an object of regulation than as a common, collective enterprise directed at the social control of business. Public utility in this sense was a normative undertaking rather than a technical way of regulating a certain kind of activity.²¹ In targeting new forms of economic power, public utility regulation was a piece of the broader effort aimed at devising working rules for the social control of business, an exercise viewed as much in social and political terms as in economic ones.

As part of a positive program of institutional development focused on devising tools to solve problems of social control, public utility regulation was thus intended to be open-ended, provisional, and experimental. It is in this sense that public utility represented a legal and policy innovation of the first order. There was no fixed set of understandings or received wisdoms regarding how it would or

should evolve. It was, and always would be, a work in progress. By necessity, it would change and adapt over time in response to new circumstances.

B. Economic Critiques of Public Utility

Although the public utility concept had its critics from the beginning,²² professional economists and a few economically minded lawyers mounted a vigorous and sustained critique of public utility regulation in the 1960s and 1970s that transformed the concept. To these critics, many of whom were affiliated with the University of Chicago, rate regulation, or what was sometimes broadly construed as economic regulation, was considered anathema to the principles of market competition. The technical criticisms that stemmed from the rigorous application of marginalist economic principles and early conceptions of public choice complemented a broader agenda that sought to stop a rapidly growing regulatory state from extinguishing economic liberty.²³

The critique consisted of three key points. First, critics challenged the theory of natural monopoly as an ongoing rationale for regulation.²⁴ Second, in contrast to the notion that utility regulation emerged in response to the public interest, economists advanced a public choice, or capture explanation, which held that regulated entities actively sought regulation and used it for their benefit.²⁵ Third, economic models and subsequent empirical research indicated that firms operating under regulatory constraints had an incentive to overinvest in their rate base, thus raising costs and destroying consumer welfare.²⁶

The general conclusion that emerged from these critiques was straightforward and devastating: regulation did more than harm than good.²⁷ Even in cases of natural monopoly, it was preferable to leave the market alone rather than try to correct market failure or protect against possible abuses of market power with regulation.²⁸ According to one study, there was no evidence that regulation actually had any demonstrable positive effect in reducing electricity prices when compared to the alternative.²⁹ Moreover, the pathologies of rate regulation—as manifest in the tendency of utilities to overinvest in their rate base and the inevitability of capture—meant that even if the regulatory enterprise

17. See PAUL J. GARFIELD & WALLACE F. LOVEJOY, PUBLIC UTILITY ECONOMICS 32-33 (1964).

18. See, e.g., Eugene A. Gilmore, *The Wisconsin Public Utilities Act*, 19 THE GREEN BAG 517, 517-18 (1907).

19. See William J. Hausman & John L. Neufeld, *The Market for Capital and the Origins of State Regulation of Electric Utilities in the United States*, 62 J. ECON. HIST. 1050, 1051 (2002).

20. See, e.g., *Jersey Cent. Power & Light Co. v. Fed. Energy Regulatory Comm'n*, 810 F.2d 1168, 1189 (D.C. Cir. 1987) (Starr, J., concurring).

21. See MARTIN G. GLAESER, OUTLINES OF PUBLIC UTILITY ECONOMICS 216 (1927).

22. See, e.g., Horace M. Gray, *The Passing of the Public Utility Concept*, 16 J. LAND & PUB. UTILITY ECON. 8, 12-13 (1940).

23. See, e.g., MILTON FRIEDMAN, CAPITALISM AND FREEDOM 28 (1962).

24. See, e.g., Harold Demsetz, *Why Regulate Utilities?*, 11 J.L. & ECON. 55, 59 (1968).

25. See George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3, 3 (1971).

26. See Harvey Averch & Leland L. Johnson, *Behavior of the Firm Under Regulatory Constraint*, 52 AM. ECON. REV. 1052, 1068 (1962).

27. See, e.g., Richard A. Posner, *Natural Monopoly and Its Regulation*, 21 STAN. L. REV. 548, 625 (1969).

28. Demsetz advocated subjecting monopoly franchises to competitive bidding, with the franchise awarded to the bidder offering to provide service at the lowest price. See Demsetz, *supra* note 24, at 56-62.

29. See George J. Stigler & Claire Friedland, *What Can Regulators Regulate? The Case of Electricity*, 5 J.L. & ECON. 1, 8 (1962).

itself was born of noble intentions, it was sure to result in diminished social welfare.³⁰

More than anything else, what resulted from the criticisms of public utility was a substantial thinning of the concept. By taking public utility out of the broad normative context that legal realists and early institutional economists investigated, and by stripping it down to its bare-boned economic features, the post-1960 economic critique made it into something that could be modeled under the strict parameters of neoclassical economics and held up by lawyers and economists as an example of the endemic problems afflicting government regulation and the concomitant superiority of markets. Henceforth, competitive markets were viewed by deregulation advocates as the goal toward which reform of public utility regulation should aim.

C. Technical Limits, Energy Crises, and Environmental Concerns

At the same time that economists were critiquing public utility regulation, the electric power sector was undergoing a fundamental technological shift and facing a series of external crises that raised very real questions about the IOU business model. First, by the 1960s, economies of scale in power generation had been exhausted.³¹ Second, the oil embargoes and associated energy crises of the 1970s translated into higher fuel costs, higher electricity prices, a growing emphasis on conservation and efficiency, and slower growth in electricity demand.³² Third, mounting concerns about the environmental impacts of power generation combined with the new environmental laws of the 1970s made it easier for opponents of large power generation facilities to slow or stop new projects and to impose expensive new pollution control requirements, creating additional, unanticipated costs.³³ As a result, the concept of public utility continued to suffer in the face of an ongoing economic crisis that some blamed on overregulation—all of which served to reinforce the general criticisms advanced by advocates of regulatory reform.³⁴

D. Deregulation and the Uneasy Embrace of Competition

By the 1990s, after several successful efforts to deregulate other sectors of the economy, there was a concerted move at federal and state levels to introduce competition to various parts of the electric power industry.³⁵ Congress and FERC

unbundled power generation from transmission and established an open-access, common carrier regime for interstate transmission that would allow competitive wholesale power markets to flourish.³⁶ At the core of these new wholesale markets were important new organizational forms: RTOs and ISOs, nonprofit entities governed by their members and charged with managing the transmission system and administering the wholesale power markets.³⁷

Parallel to the federal effort to establish wholesale power markets, several states moved ahead during the 1990s with electricity restructuring efforts. Most notably, California initiated an ambitious effort in 1996 to restructure its electricity sector.³⁸ But in the wake of the California electricity crisis of 2000-2001, many of the states that had initiated retail restructuring suspended or abandoned their efforts.³⁹ Today, fifteen states allow for some form of retail electric choice.⁴⁰ While switching rates have varied across states, they have generally been quite low for residential customers, with higher rates of switching for larger industrial and commercial customers.⁴¹

Several important lessons can be gleaned from the effort to introduce competition into various parts of the electricity sector. First, market design matters a great deal. Given the considerable complexity of electric power systems and certain characteristics that make electricity markets very difficult to design and manage, the introduction of competition into the sector proved to be more challenging than some advocates may have initially realized.⁴² Second, introducing competition requires quite a bit of regulation and ongoing oversight. Third, as with any form of regulation, the introduction of competition is always going to be subject to political compromises. Fourth, the process of market design has emerged as an intense object of interest for market participants.⁴³ Fifth, even if economic efficiency was the stated goal of electricity restructuring, it was always less important than maintaining system reliability.⁴⁴ Finally, while there is evidence of more efficient use of generation and other nongeneration alternatives in the wholesale power markets, questions remain regarding who

30. See, e.g., Paul M. Hayashi & John M. Trapani, *Rate of Return Regulation and the Regulated Firm's Choice of Capital-Labor Ratio: Further Empirical Evidence on the Averch-Johnson Model*, 42 S. ECON. J. 384, 397 (1976).

31. See RICHARD F. HIRSH, *POWER LOSS: THE ORIGINS OF DEREGULATION AND RESTRUCTURING IN THE AMERICAN ELECTRIC UTILITY SYSTEM* 55-58 (1999).

32. See *id.* at 58-63.

33. See *id.* at 63-68.

34. See, e.g., Richard J. Pierce Jr., *The Regulatory Treatment of Mistakes in Retrospect: Canceled Plants and Excess Capacity*, 132 U. PA. L. REV. 497, 497-98, 500-02 (1984).

35. See Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323, 1408-09 (1998).

36. See, e.g., Energy Policy Act of 1992, Pub. L. No. 102-486, §711, 106 Stat. 2776, 2905.

37. FERC Order 2000, *Regional Transmission Organizations*, 65 Fed. Reg. at 841-911.

38. See A.B. 1890, 1995-96 Reg. Sess. (Cal. 1996).

39. See Paul L. Joskow, *The Difficult Transition to Competitive Electricity Markets in the United States*, in *ELECTRICITY DEREGULATION: CHOICES AND CHALLENGES* 32 (Griffin & Puller eds., 2005).

40. See *Status of Electricity Restructuring by State*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/electricity/policies/restructuring/restructure_elect.html (last updated Sept. 2010).

41. See *State Electric Retail Choice Programs Are Popular With Commercial and Industrial Customers*, U.S. ENERGY INFO. ADMIN. (May 14, 2012), <http://www.eia.gov/todayinenergy/detail.cfm?id=6250>.

42. Cf. Paul L. Joskow, *How Will It End? The Electric Utility Industry in 2005*, 9 *ELECTRICITY J.* 67, 69 (1996).

43. See Marc K. Landy et al., *Creating Competitive Markets: The Politics of Market Design*, in *CREATING COMPETITIVE MARKETS: THE POLITICS OF REGULATORY REFORM* 1, 9-11 (Landy et al. eds., 2007).

44. See William W. Hogan, *Electricity Wholesale Market Design in a Low Carbon Future*, in *HARNESSING RENEWABLE ENERGY IN ELECTRIC POWER SYSTEMS* 115 (B. Moselle et al. eds., 2013).

is capturing the benefits of competition.⁴⁵ Some analysts point to evidence demonstrating that owners of low-cost baseload generation have been the primary beneficiaries while residential customers have seen few benefits.⁴⁶

None of which is intended to suggest that the organized markets do not provide important benefits and opportunities for innovation, including efforts to integrate renewables and demand response onto the grid.⁴⁷ The mistake, this Article contends, is to see these markets as antithetical to a broader understanding of public utility. In fact, RTOs and ISOs share many of the characteristics of public utilities and are regulated as such. The markets that they administer are carefully designed and highly regulated, mimicking in some respects the actions of systems operators in vertically integrated utilities. Planning is and always will be a key part of the effort to maintain reliability and enhance the grid. In many respects, the organized wholesale electricity markets stand as working examples of how competition can be deployed to discipline certain forms of behavior and to open up certain components of formerly regulated industries—a basic insight that realists and institutional economists advanced in the early twentieth century in their elaboration of public utility.

E. Public Utility in an Age of Disruption

Today, the traditional utility business model is facing a number of threats from various customer- or demand-side innovations. Increased demand response, efficiency, distributed generation, and storage (collectively known as distributed energy resources) are reducing load for utilities and raising important questions about whether the current IOU business model can survive.⁴⁸

As in past debates over electricity restructuring, the contemporary discussion is often framed as a battle between old and new, with entrenched monopolies seeking to preserve the status quo pitted against new entrants and new technologies promising disruptive innovation. In the case of electricity, however, the rhetoric of disruption ignores any sort of positive reform agenda attached to the broader notion of public utility. By emphasizing radical change rather than pragmatic adjustment, it constrains our ability to think about electricity (and energy) as a collective, social enterprise precisely at the time when we are becoming more active participants in that enterprise.⁴⁹ A more positive agenda would recognize the vital role that these resources can play in a clean energy future and would

work to design rates and systems-integration policies to accommodate these resources in a fair and open way.⁵⁰ It would embrace the notion that as the electric power system becomes more participatory, the importance of a broad public utility framework to support planning, coordination, and innovation only increases.

III. Public Utility and the Low-Carbon Future

If we accept the premise that any future low-carbon electricity system will include a more diverse and interconnected set of actors with widely varying assets, behaviors, and motivations, it seems that a broader concept of public utility has much to offer. Mobilizing and channeling the investments needed to reduce emissions across the power sector by 80% or more by midcentury will require a level of certainty regarding cost recovery that markets alone seem unable to provide. Coordinating an increasingly diverse array of supply- and demand-side resources, owned and operated by thousands of independent actors, will place demands on systems operators that far exceed anything experienced to date. Creating space for innovation, experimentation, and demonstration at scale calls for durable policy supports, a level of public-private cooperation, and a shared commitment that go well beyond current approaches.

A. Planning and Investment

One of the central features of the traditional model of public utility regulation was its role in allowing utilities to access capital on favorable terms in order to make long-term investments. By shifting the risks of bad investments from ratepayers to investors, the subsequent move to markets has surely worked to protect ratepayers from excessive and even wasteful spending by utilities. But it has also made investments in new assets more uncertain and, in some cases, more costly than they would otherwise be under the traditional model. There is a growing recognition in this respect that current market frameworks, even with carbon pricing, will not provide sufficient incentives to make investments in low-carbon generation technologies at the pace and scale required to achieve substantial decarbonization by midcentury.

Put another way, the appealingly simple idea that pricing carbon emissions will allow liberalized electricity markets to coordinate investment in low-carbon generation appears to be more challenging than expected. The current iterations of carbon pricing schemes are simply not sufficient to mobilize and channel the investments necessary to decarbonize the power sector by 2050.⁵¹ Making carbon emissions more expensive, in other words, appears to offer only a partial solution to decarbonizing the power sec-

45. See, e.g., Lucas W. Davis & Catherine Wolfram, *Deregulation, Consolidation, and Efficiency: Evidence From US Nuclear Power*, 4 AM. ECON. J.: APPLIED ECON. 194, 194 (2012).

46. See Lester Lave et al., *Deregulation/Restructuring Part I: Reregulation Will Not Fix the Problems*, 20 ELECTRICITY J. 9, 18-19 (2007).

47. See, e.g., Midwest Independent Transmission System Operator, Inc., 134 FERC ¶ 61141 (2011); FERC Order No. 764, *Integration of Variable Energy Resources*, 139 FERC ¶ 61246 (2012).

48. See ANNUAL ENERGY OUTLOOK 2014, *supra* note 6, at MT-16.

49. See, e.g., NEW YORK DEPARTMENT OF PUBLIC SERVICE, *REFORMING THE ENERGY VISION*, Staff Report and Proposal, CASE 14-M-0101 (Apr. 24, 2014), at 54.

50. See David M. Newberry, *Reforming Competitive Electricity Markets to Meet Environmental Targets*, 1 ECON. ENERGY & ENVTL. POL'Y 69, 71 (2012).

51. See *id.*

tor, especially when future prices are uncertain. Given the higher capital intensity of a low-carbon electricity system compared to the current fossil-based system, and given the long-lived nature of many of these assets, finding ways to de-risk and thus reduce the cost of capital for these investments is a critical task for policy.⁵²

Sequencing these investments in a manner that integrates them into the existing electricity grid without causing widespread disruption will also require increased planning. In the United States, planning has long been at the heart of traditional utility regulation and is a major focus of the RTOs and ISOs. During the 1980s and 1990s, many state PUCs embraced formal planning exercises to assert more regulatory oversight over the utility-centric planning exercises that had prevailed in the past.⁵³

While the actual practice of resource planning varies by state, most of the planning processes proceed on the basis of three main steps: (1) forecasting load (demand) over the relevant time horizon; (2) determining portfolios of existing and future resources to meet demand; and (3) evaluating the costs and risks associated with each portfolio.⁵⁴ All of these planning exercises generally require consideration of feasible supply-side, demand-side, and transmission resources.⁵⁵ Most have time horizons of ten years or more, and most require updating on a regular (two to four year) basis.⁵⁶ Many planning exercises have also embraced more participatory frameworks that include ratepayer advocates and other stakeholders.⁵⁷

Given the prospect of future carbon regulations, integrated resource planning (IRP) exercises in a number of states have used “carbon adders” in evaluating and guiding future investments.⁵⁸ This has allowed utilities, regulators, and stakeholders in the IRP process to look out over multidecade time horizons and to compare investments under various potential carbon constraints.⁵⁹ Likewise, carefully considering distributed and demand-side programs in the IRP process has resulted in decisions to forgo investment in new generation.⁶⁰ Commitment to a diverse portfolio of

resources has also worked to shift attention away from an exclusive focus on short-term fuel prices. All of which has made it possible for PUCs and regulated utilities to consider investments that might not be cost-effective today, but that make economic sense over longer time frames that incorporate carbon constraints. It is no surprise, in this respect, that EPA’s recently proposed rule to regulate carbon dioxide emissions from existing fossil fuel-fired power plants identifies state IRP processes as a possible vehicle for developing the state emissions reduction plans required under the rule.⁶¹

At the federal level, FERC has also pushed for a more expansive approach to regional transmission planning and cost allocation that explicitly takes account of the transmission needs associated with public policy objectives such as renewables mandates.⁶² In accordance with Order 1000, which establishes a general framework for transmission planning and cost allocation, regional planning efforts have been established across the country, providing the basis for new investment intended to bring more renewables onto the grid.⁶³ Finally, resource planning at both the federal and state levels has also been a critical tool in managing the impact of new environmental regulations and cheap natural gas on existing coal-fired power plants.

In a world of increasing complexity, and in the face of the truly daunting challenge of decarbonizing the power sector by midcentury, recovering a more affirmative and expansive approach to planning and finding ways to de-risk investments in low carbon technologies is a crucial part of any realistic pathway to a low-carbon future.

B. Coordination and Systems Operation

Because the electric power system lacks storage and must be perfectly balanced in real time, there are considerable constraints on the coordination mechanisms that can be used to maintain balance and ensure reliability. With a more diverse set of intermittent resources distributed at multiple levels up and down the electricity supply chain involving many thousands, if not millions, of individual actors, these coordination and systems operation challenges increase substantially.

With respect to efforts to decarbonize the power sector, two of the biggest challenges facing systems operators are the integration of large amounts of variable utility-scale renewables (wind and solar) and the proliferation of distributed energy resources that will connect to the grid. Responding to these challenges will require more coordination and control as well as significant increases in investment to modernize and expand the bulk transmission grid and to build more robust and intelligent distribution systems.

52. See Robert Gross et al., *Risks, Revenues, and Investment in Electricity Generation: Why Policy Needs to Look Beyond Costs*, 32 ENERGY ECON. 796, 801 (2010).

53. See Mark Hanson et al., *Electric Utility Least-Cost Planning: Making It Work Within a Multiattribute Decision-Making Framework*, 57 J. AM. PLAN. ASSOC. 34, 35-36 (1991).

54. Jordan Wilkerson et al., *Survey of Western U.S. Electric Utility Resource Plans*, 66 ENERGY POL’Y 90, 91 (2014).

55. See RACHEL WILSON & BRUCE BIEWALD, SYNAPSE ENERGY ECON., BEST PRACTICES IN ELECTRIC UTILITY INTEGRATED RESOURCE PLANNING 7 (2013).

56. See *id.* at 6.

57. See, e.g., Wilkerson et al., *supra* note 54, at 90.

58. See, e.g., GALEN BARBOSE ET AL., LAWRENCE BERKELEY NAT’L LAB., MANAGING CARBON REGULATORY RISK IN UTILITY RESOURCE PLANNING: CURRENT PRACTICES IN THE WESTERN UNITED STATES (2009), available at <http://escholarship.org/uc/item/3rd811t9>.

59. See, e.g., WILSON & BIEWALD, *supra* note 55, at 16-25; A.B. 327 §8 (Cal. 2013).

60. Public Service Company of Colorado, for example, reduced its projected 2018 resource needs from one thousand megawatts to less than three hundred megawatts as a result of its demand-side management (DSM) and solar distributed generation (DG) programs. See, e.g., 1 PUB. SERV. CO. OF COLO., 2011 ELECTRIC RESOURCE PLAN 5 (2011).

61. See Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Generating Units, Proposed Rule, 22 (June 2, 2014).

62. See FERC Order No. 1000, Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49842, 49876 (Aug. 11, 2011) (codified at 18 C.F.R. pt. 35).

63. See *id.* at 49845-47.

Increasing the amount of distributed energy resources on the grid will also require more coordination as well as significant upgrades of existing distribution systems to accommodate bidirectional power flows associated with increasing amounts of such resources.⁶⁴ As more utility customers begin to play a more active role in generating, storing, and managing electricity—that is, as more customers adopt distributed generation, storage, demand-response, or some combination of these—the distribution system is changing from a one-way radial network that delivered electricity to meet load to a much more dynamic, multi-directional network.⁶⁵ However the grid comes to be organized, a set of layered institutions will have responsibility for regulating and coordinating various transactions, managing and operating the transmission and distribution systems, and maintaining system reliability. It is these institutions that have the obligations and responsibilities of public utility in its broadest sense.

C. Experimentation and Innovation

The early twentieth century idea of public utility was expressly conceived in experimentalist terms. And while the historical record is not exactly overflowing with examples of Brandeisian experimentalism by PUCs, neither is it dominated entirely by the kind of anti-innovation, rent-seeking behavior that public choice critics and others have pointed to as the default for PUCs. In fact, anecdotal evidence from across the country suggests that PUCs are actively engaged in various policy experiments and are playing important roles in the effort to demonstrate the viability of various low-carbon generation options.

Ongoing PUC efforts to experiment with new rate designs and other incentive programs are important examples in this respect. Specifically, a number of PUCs have moved away from traditional cost-of-service ratemaking toward various types of performance-based rates to provide better incentives for utilities to adopt certain practices and improve their performance.⁶⁶ Likewise, PUCs across the country have adopted programs that allow utilities to offer more dynamic rates, including so-called time-of-day or time-of-use rates as well as real-time pricing, which provide price signals to retail customers that more accurately reflect the wholesale costs of electricity during different periods.⁶⁷ Some PUCs have broadly reformed rate designs and regulatory frameworks to accommodate the growth of distributed energy resources. A handful of PUCs have also worked with regulated utilities to develop policies and programs to test the deployment of new technologies. Smart grid demonstration projects of various types, for example,

have been initiated in multiple jurisdictions, with PUCs playing important roles in some cases.⁶⁸

At the same time, other PUCs are also working with utilities to support large investments in commercial-scale demonstration projects of advanced low-carbon technologies.⁶⁹ To take an important example, the Mississippi Public Service Commission, together with the federal government, has been actively involved in the Mississippi Power Company's Kemper plant, a commercial scale demonstration project that combines an advanced coal-fired power plant based on integrated gasification combined cycle technology with carbon capture and storage.⁷⁰

Regardless of the individual merits of this project (and others like it), it will clearly have broad social benefits. The only way to find out whether this technology will work at scale is to build one at scale. Thus, rather than view such a project as yet another example of the excesses of rate regulation, it would seem more productive to view it instead as a crucial experiment with a technology that could be a vitally important part of a low-carbon future. This is especially true in cases where the venture in question fails.

Innovation in the power sector poses a different set of challenges than those confronting most other sectors. Cost estimates for widespread deployment of advanced technologies to upgrade the transmission and distribution systems in the United States are typically in the hundreds of billions of dollars.⁷¹ Without question, software and new digital technologies will play important roles in modernizing the grid and facilitating innovation across the power sector, but the ongoing digitalization of the grid will hardly be enough by itself to decarbonize the electricity system.

A more active form of public utility regulation that combines broad responsibilities for planning and coordination across the whole system with a capacity for policy experimentation and learning offers a critical set of tools and resources that could play a major role in the effort to realize that future.

IV. Conclusion

Public utility is not a thing or a single type of enterprise, but an ongoing, open-ended project; a collective undertaking that is distinctively American and one that, even now, well past its hundredth birthday, is still very much up for grabs. The choice of making a low-carbon future can only be realized if it is approached as a shared, political choice—a choice that will require a significant amount of statecraft, public participation, and private enterprise, a choice that calls for a revitalized understanding of public utility.

64. See, e.g., Rick Fioravanti & Nicholas Abi-Samra, *Working at the Edge of the Grid: How to Find Value in Distributed Energy Resources*, 152 PUB. UTIL. FORTNIGHTLY 32, 33 (2014).

65. See NEW YORK DEPARTMENT OF PUBLIC SERVICE, *supra* note 49, at 22.

66. See Sonia Aggarwal & Hal Harvey, *Rethinking Policy to Deliver a Clean Energy Future*, 26 ELECTRICITY J. 7, 16-19 (2013).

67. See, e.g., Theresa Faim et al., *Pilot Paralysis: Why Dynamic Pricing Remains Over-Hyped and Underachieved*, 26 ELECTRICITY J. 8, 10-17 (2013).

68. See Joel B. Eisen, *Smart Regulation and Federalism for the Smart Grid*, 37 HARV. ENVTL. L. REV. 1, 17-20 (2013).

69. See Jonas J. Monast & Sarah K. Adair, *Completing the Energy Innovation Cycle: The View From the Public Utility Commission*, 65 HAST. L.J. 1345 (2014).

70. *Id.* at 1386.

71. See, e.g., EPRI, ESTIMATING THE COSTS AND BENEFITS OF THE SMART GRID: A PRELIMINARY ESTIMATE OF THE INVESTMENT REQUIREMENTS AND THE RESULANT BENEFITS OF A FULLY FUNCTIONING SMART GRID 1-4-1-6 (2011).

H O N O R A B L E M E N T I O N

Mapping, Modeling, and the Fragmentation of Environmental Law

by Dave Owen

Dave Owen is a Professor at the University of California, Hastings.

Over the past four decades, increased data availability, new software systems, and exponentially greater computing power have combined to turn spatial analysis—that is, quantitative analysis of data coded to specific geographic coordinates—into the coin of the environmental realm. Thousands of analysts in dozens of fields now spend their days gathering and crunching spatial data. Their efforts serve a wide variety of purposes and are leading to new ways of conceptualizing ecological systems and environmental change.

The emergence of spatial analysis merits revisiting environmental law's traditional debates about integrative, holistic decisionmaking. Spatial analysis can facilitate better assessments of the cumulative environmental consequences of activities dispersed across space and time. By enabling analysts to simultaneously evaluate a variety of environmental impacts, spatial tools and models can allow concurrent pursuit of multiple environmental goals. And by producing maps, which are a compelling and accessible means of conveying information, spatial analysis can improve communication among the many entities involved in environmental policymaking. In short, spatial analysis can facilitate more integrative approaches to environmental law.

Despite that potential, legal thinkers have devoted little attention to spatial analysis. Even as other research fields move toward quantitative analysis based on spatial data, environmental law research remains largely the domain of qualitative argument, often grounded in intuition and anecdote and delivered exclusively in prose. This Article argues for bridging the divide between spatial analysis and environmental law by exploring some of spatial analysis's implications for environmental law. Using land use

as a central example, it explains how spatial analysis can change which environmental problems we find cognitively tractable, what tools we use to address those problems, and to whom we allocate authority to respond. It finishes with a focus on legal research, explaining how spatial analysis could generate more empirically grounded and practically useful academic inquiries about environmental law. Spatial analysis technologies are by no means perfect tools, and they can suffer from the opacity, manipulability, and false certainty that plague any complex and quantitative mode of analysis.¹ But despite certain limitations, the emergence of spatial analysis is an important, and potentially quite positive, development for environmental law.

I. The Emergent Geocoded Age

From climate change to wildlife management, models now pervade almost every sub-field of environmental decisionmaking. Many of those models draw upon spatial data, and many produce spatially explicit outputs—which then can be used as input data by other models. These models add a whole new power to spatial analysis. Rather than just delineating the location of current landscape features, or teasing out causal relationships based on data about past events, they allow environmental managers to offer spatially explicit representations of possible futures.

While technological advances allow spatial analysts to do remarkable things, those advances are not an unqualified good. Any increase in the technological sophistication of decisionmaking creates the threat of overreliance on technology at the expense of common sense. Quan-

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1. See generally Kenneth A. Bamberger, *Technologies of Compliance: Risk and Regulation in a Digital Age*, 88 TEX. L. REV. 669, 675-76 (2010) (describing the role of automated risk modeling software in the 2008 financial collapse); James D. Fine & Dave Owen, *Technocracy and Democracy: Conflicts Between Models and Participation in Environmental Law and Planning*, 56 HASTINGS L.J. 901 (2005) (recognizing “many sources of uncertainty” inherent in complex modeling systems); Wendy Wagner et al., *Misunderstanding Models in Environmental and Public Health Regulation*, 18 N.Y.U. ENVTL. L.J. 293 (2010) (highlighting a common misperception of complex models as “truth machines”).

titative modes of decisionmaking almost invariably involve oversimplifications, subjective judgments, and data of uneven quality, but the apparent precision of the numeric outputs can conceal these limitations behind veils of false certitude.

But these technological advances can promote participation and inclusion. The communicative power of maps increases information availability, for maps can convey large amounts of information in an easily searchable and visually accessible format. Spatial analysts can generate animations, computer-generated views of future land use patterns, and a variety of other visualizations, all capable of making future environmental change more cognitively “available.” Lay participants can run some models and can thereby better understand the consequences of their actions and the perspectives of competing resource users. Emerging processes known as “participatory modeling” or “computer-aided dispute resolution” involve stakeholders in iterative processes of building, running, critiquing, and rerunning models designed to resolve complex environmental management challenges.

These efforts generally require substantial time investment, but they also can produce significant benefits. They can bring multiple perspectives into the model-development process, helping balance policy preferences and unexamined assumptions held by the modelers. Actively involving nonmodelers can be a more effective way of conveying information, allowing participants to be active rather than passive learners. A participant who has helped develop or run a model is likely to have a more realistic understanding of the limitations and uncertainties of the model, yet also may have more confidence that the modeling outputs represent a good-faith effort toward objectivity. In an era when environmental debates are routinely undermined by both overconfidence in and distrust of scientific information, building that sort of realism can be crucially important. If carefully used, these tools have much to offer. If they are to act at all, environmental managers must try to understand and, often, predict the behavior of complicated systems. Any set of tools that even incrementally improves those abilities holds value. With spatial analysis, that value can be substantial.

II. Spatial Analysis, Environmental Law, and Changing Land Use

Almost any regulatory response to an environmental problem requires a demonstration that the problem exists, some explanation of its causes, and a reasonably robust grasp of how individual activities create problems manifested at broader temporal and spatial scales and across jurisdictional boundaries. If the regulatory response is to be effective, it requires some understanding of the negative tradeoffs and positive synergies likely to arise from

regulatory intervention. Because of the complex, multiscalar, and intertwined nature of environmental problems, achieving that understanding can be difficult, and those difficulties can limit the problems we respond to—or even recognize. Advances in spatial analysis can expand that realm of understanding.

A. *What We Understand*

In several ways, spatial analysis already is improving responses to multifaceted environmental problems. One of the best illustrations of this potential involves mapping environmental constraints when siting development projects. Most development projects are subject to multiple regulatory constraints that can be depicted spatially. For example, wetlands, floodplains, zoning controls, conservation lands, and protected habitat areas all can be mapped, and all provide important signals about where a project might face a difficult regulatory process. Similarly, many landscape features desired by developers, like favorable soils and slopes, low taxes, quality school districts, proximity to complementary businesses, and access to roads and other preexisting infrastructure, also can be mapped. Geographic information systems (GIS) technology allows developers to find optimal areas and also allows local officials to steer development projects toward particularly promising sites.

The same approach can target conservation efforts. A land trust might overlay data layers showing wetland resources, aquifer recharge zones, rare plant and wildlife habitats, and potential habitat corridors to determine where to purchase conservation easements. They can use economic development models to identify parcels where development potential is high, and therefore the threat to resources is larger, or, conversely, where development potential is lower, reducing purchase prices and potential conflict with community economic development goals. Likewise, economic models can explore whether purchase- or zoning-based strategies would more effectively accomplish conservation and economic goals.

B. *How We Regulate: Changing Legal Instrument Selection*

The evolution of spatial analysis has important implications not just for our conceptualization of the dynamics of environmental change, but also for the legal tools we use to address these dynamics.

I. Synoptic Regulation

One recurring challenge of environmental law concerns regulatory approaches that demand information-intensive studies or plans. In theory, these laws should facilitate the

sort of broad, integrative thinking that almost everyone agrees is desirable. But the practical utility of those laws has been hotly debated for decades.

While spatial analysis cannot make the challenges of synoptic analysis disappear, it can expand the realm of the possible, making spatially and temporally broad analyses viable where they previously were unrealistically ambitious. The ability of models to simulate the combined effect of many different emission sources on regional air pollution, or of a variety of land use changes upon water quality, both exemplify that capacity. Environmental impact assessment laws provide a rare obligation to address, in a single process leading to a unified document, the impacts of a project on a variety of environmental media, and to consider alternatives to that project. As modeling capabilities increase, retaining such a procedural obligation for crossmedia, multi-scalar analysis should become increasingly important and viable. Advances in spatial analysis do not imply that we should abandon the hedge strategies we have adopted to compensate for pervasive informational shortfalls. But increases in our analytical capacity clearly do mean that the debate over these competing approaches needs to evolve. Comprehensive planning and analysis have produced uneven results, but as we choose among regulatory instruments, past limitations should not prevent us from asking whether technological advances are closing the gaps between our synoptic ambitions and our practical realities.

2. Environmental Trading Systems

A second recurring challenge of environmental law involves turning the theoretical appeal of environmental trading systems into practical results. Here, as well, spatial analysis offers the potential for supporting more economically efficient and environmentally protective regulatory approaches. In theory, the appeal of trading systems is elegantly simple: by allowing exchanges across large geographic areas and through time, trading systems should allow regulated actors to efficiently allocate the burdens of compliance while still attaining the desired environmental result. Often, however, such trades create a risk that the balance of benefits and burdens will somehow be skewed, with the imbalance operating to the detriment of environmental protection, and perhaps also creating objectionable distributional impacts. But regulators will have much more work to do, and the concomitant unpredictability and higher transaction costs may deter market participation.

Advances in spatial analysis can support a promising alternative approach. Rather than relying on regulated entities to identify their preferred mitigation option, regulators can preapprove a set of mitigation options. Thus, for example, wetlands regulators can identify areas with high restoration potential, or where high-value wetlands are under threat, and can specify those areas as preapproved mitigation zones. Developers then would receive expedited approval for trades involving mitigation in those areas.

Regulators and the public receive better assurance that individual trades will protect environmental values and will fit into a coherent larger plan, and developers avoid the uncertainty and delay associated with protracted review of each individual transaction.

Spatial analysis can make this alternative approach much more effective by informing decisions about the scale and construction of the trading system—how much development is likely, where it may occur, and what kinds of impacts that development might create. That information can help the analysts assess what sort of mitigation is needed, and also how much. All of this information can help regulators decide on the scale and mechanics of the trading program or whether a trading program will be viable at all. Additionally, spatial analysis can help maximize the return on mitigation purchases. Regulators also can use development models to identify areas where, absent mitigation purchases, development would be likely to occur. That identification could reduce the “additionality” problems that result when public money is expended to protect resources not under any realistic threat. Spatial analysis also can link individual purchases into a coherent larger plan. By analyzing not just the individual value of each protection or restoration project, but also the potential interconnections between different mitigation areas, analysts can create synergy among separate transactions.

Spatial modeling also raises the possibility of coordinating multiple trading systems. Instead of selecting sites based on one environmental value, the model could select sites based on their value for multiple species, wetlands protection, water supply protection, and recreation. By prioritizing multiple targets, the program also could facilitate an integrated response to mitigation requirements set by several different laws. The end result could be a trading system based on preapproved receiving zones, all selected to maximize a broad set of environmental and nonenvironmental goals.

Despite their flaws, trading systems already pervade environmental regulation, and improvements that ameliorate some of the externalities and inefficiencies of those existing systems therefore could have immense value, even if the reforms are only partial. These changes therefore should transform how environmental lawyers evaluate trading systems. Where spatial tools allow better planning and oversight, environmental trading schemes should present viable options, sometimes, even, in circumstances where a trading scheme would have been infeasible or unwise 20 years ago.

C. Toward a More Functional Federalism

Just as advances in spatial analysis will affect which environmental problems we attempt to address and how we address them, they also have implications for some of environmental law’s traditional *who* questions: which entities, within or outside government, should address environmental problems, and how, if at all, should those entities

coordinate their efforts? Spatial analysis can help complex systems of overlapping federalism work.

If the capacity for effective communication among different levels of government is limited, then a system of rigid spheres of authority may make sense. Conversely, if the potential for effective intergovernmental dialogue is high, different levels of governments should be able to communicate their needs and priorities, isolate areas of disagreement, and find common ground.

In several ways, spatial analysis can help create the latter circumstance, and a particularly illustrative set of examples involves processes sometimes called “alternative futures modeling” or “scenario planning.” Modelers can develop future land use scenarios in a variety of ways, including working with people in the affected area to define scenarios they think are plausible or desirable. The modelers then explore the implications of those scenarios for a variety of potential outputs. Based on the initial results, they can develop new scenarios or work backward from desired future outcomes to recommended present policy approaches. The end result is generally a series of detailed maps that depict plausible alternative futures for the modeled area, as well as charts and graphs explaining differences between the alternatives.

In several ways, these processes can facilitate the kind of interjurisdictional coordination upon which dynamic federalism theories implicitly rely. They allow evaluation of the combined implications of a variety of current trends and policies. That review may reveal future conflicts or opportunities that might never have become apparent through individual plan-by-plan or project-by-project studies. Futures modeling also allows participants to explore the potential implications of—and perhaps, to reconsider—their assumptions. Often modeling reveals otherwise unseen options that can ameliorate interjurisdictional tensions. Advance planning gives communities opportunities to set up financial mechanisms, like environmental trading systems or transferable development rights, to ameliorate environmental impacts. Alternatively, confronting the future implications of unrestrained development may lead people to conclude that some uncompensated limitation on property use is an appropriate contribution toward maintaining a community’s identity and quality of life. In short, modeling alternative futures can help people achieve the goals of environmental law while still preserving ample local discretion and community autonomy.

To be clear, this Article’s claim is not that the emergence of spatial analysis will generate universal acceptance of dynamic federalism. But spatial analysis can communicate federal, state, and local goals, explore compatibilities between those goals, and cabin conflict to more manageable and discrete zones. That capacity should give at least a moment’s pause to lawmakers and judges who assume that rigid limits on federal or state environmental regulation are necessary to protect spheres of state or local autonomy.

III. Spatial Analysis and Environmental Law Research Methodologies

Lastly, the implications of spatial analysis extend beyond the subjects of environmental law research and also implicate its methodologies. For decades, assessing how environmental law changes real-world outcomes has often been difficult. For this reason, debate is still robust about whether and how some of our most familiar environmental laws provide environmental protection. Spatial analysis gives environmental law researchers new tools to address these questions. By comparing development patterns in areas subject to a particular law to development patterns in exempted areas, researchers can assess how that law actually affects outcomes. Longitudinal studies, which examine development patterns before and after the imposition of some environmental constraint, could help assess what on-the-ground impact laws actually have.

This sort of research is not exactly new. For decades, economists have been using both theoretical models and actual datasets to test the implications of environmental laws. But such work rarely appears in legal journals, and even when it does, the authors usually are not lawyers. That is a significant absence. Environmental lawyers understand, at least at a qualitative level, how particular regulatory provisions fit within broader environmental law systems, how environmental law evolves and changes, what roles environmental law assigns to different actors, and how different institutions tend to respond to their roles. That legal perspective could help interdisciplinary research teams identify important research questions, develop hypotheses, flag potentially confounding variables, and interpret results.

The rise of environmental modeling creates similar opportunities for engagement. One primary goal of many environmental modelers is to understand and simulate the feedback loops between human and natural systems. But the relationships between human and environmental systems are also heavily mediated by law. Lawyers could offer important insights about how legal rules might generate environmental consequences and about how environmental change generates legal responses. In some circumstances, that legal perspective should help modelers build better and more useful models. In others, environmental lawyers’ insight may be that the dynamics are too complicated and unpredictable to model. But that also can be an important contribution, for it can send the modelers on to more useful endeavors.

In recent years, legal research in many fields has moved toward greater reliance on quantitative analysis of empirical data and broader integration with other academic fields. But the shift has been gradual and sometimes controversial, with critics arguing that changes threaten to sidetrack legal research into a realm of impractical abstraction. But the present uses of spatial analysis suggest that here, at least, the critiques of quantitative and interdisciplinary legal research will often miss the mark. Helping federal, state, and local governments balance

economics, environmental protection, and autonomy is a highly practical goal. If, in working toward that goal, legal researchers can help achieve a better understanding of some of the core challenges of environmental law, the effort will be well worthwhile.

IV. Conclusion

Environmental law is inextricably, if sometimes uncomfortably, intertwined with environmental science, and when environmental science evolves, legal thinkers usually

ask whether law should evolve too. The emergence of quantitative spatial analysis has just begun that reaction. The products of spatial analysis often form the evidentiary basis for decisions required by environmental laws, and spatial analysts often work to fulfill environmental law's informational demands. But while environmental law has influenced spatial analysis, the feedback loop has not closed. Advances in spatial analysis have not led to any significant revisions to the structure, practice, or theory of environmental law. The time for greater engagement has come.

H O N O R A B L E M E N T I O N

Prosecutorial Discretion and Environmental Crime

by David M. Uhlmann

David M. Uhlmann is the Jeffrey F. Liss Professor from Practice and Director of the Environmental Law and Policy Program, University of Michigan Law School.

The environmental laws create a complex regulatory system affecting a wide range of economic activity in the United States. The Resource Conservation and Recovery Act (RCRA) establishes a cradle-to-grave regulatory scheme for hazardous wastes; the Clean Water Act (CWA) regulates all discharges of pollutants into waters of the United States; and the Clean Air Act (CAA) imposes limits on all air pollutants that could endanger public health and welfare. As with any complex regulatory scheme, there are significant disparities in the seriousness of environmental violations. Some involve devastating pollution, evacuation of communities, or deliberate efforts to mislead regulators. Others may be de minimis violations or isolated events that occur notwithstanding a robust compliance program.

Given the wide range of potential environmental violations, it might have been preferable for Congress to specify which environmental violations could result in criminal prosecution. Instead, Congress made only limited distinctions between acts that could result in criminal, civil, or administrative enforcement. Even the most technical violation of the environmental laws theoretically could result in criminal prosecution if the defendant acted with the mental state specified by the statute. Mental state is not required for civil or administrative violations, but the additional proof required for criminal prosecution often does little to differentiate between criminal, civil, and administrative violations. In most cases, the government must show only that the defendant acted knowingly. In other words, the government must show defendants know they are engaging in the conduct that is a violation of the law; the government is not required to show that defendants know they are breaking the environmental laws. Indeed, in some cases, the government is required to prove only that the defendant acted negligently; in other

cases, the government is not required to show any mental state at all.

If the same violation often could give rise to criminal, civil, or administrative enforcement—and if mental state requirements only preclude criminal enforcement for a small subset of violations—what determines which environmental violations result in criminal prosecution? The answer is the exercise of prosecutorial discretion, which exists in all areas of the criminal law, but assumes a particularly critical role in environmental cases because so much conduct falls within the criminal provisions of the environmental laws. Critics of environmental criminal enforcement argue that Congress gave too much discretion to prosecutors or, even worse from their perspective, to EPA enforcement officials. They note that whether a case is prosecuted criminally may be determined by nothing more substantive than whether the case originates with a criminal investigator or with one of their civil or administrative counterparts within the agency. Even supporters of criminal enforcement acknowledge that prosecutorial discretion is broad under the environmental laws. But they insist that it is no greater than in other areas of economic or regulatory crime and that Congress properly relied on the good sense of prosecutors, the wisdom of judges, and the judgment of juries to determine when violators of the environmental laws should be convicted of criminal activity.

I see no merit in debating whether prosecutorial discretion is broad under the environmental laws—it clearly is—and I concede that it may be disquieting in a nation predicated on the rule of law that we depend so much on individual prosecutors to determine what conduct should be criminally prosecuted. I also acknowledge that the extent of prosecutorial discretion under the environmental laws may raise uncertainty in the regulated community about which environmental violations will result in criminal prosecution. On the other hand, our criminal justice system always relies to some degree upon the exercise of prosecutorial discretion to determine which violations will be prosecuted criminally. To evaluate whether prosecutors have too much discretion—and to address

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claims that the environmental laws criminalize too much conduct—we need to know more about the circumstances under which environmental prosecutors exercise their discretion to seek criminal charges for violations.

For environmental crimes, I have written that prosecutors should exercise their discretion to reserve criminal enforcement for cases with one or more of the following aggravating factors: (1) significant environmental harm or public health effects; (2) deceptive or misleading conduct; (3) operating outside the regulatory system; or (4) repetitive violations.¹ Limiting criminal enforcement to cases with one or more of these aggravating factors would preclude prosecution for technical or de minimis violations and provide greater clarity about which environmental violations might result in criminal charges. The presence of one or more of these factors also would delineate an appropriate role for criminal prosecution in the environmental regulatory scheme by limiting criminal prosecution to cases involving substantial harm or risk of harm or to cases in which the conduct involves the type of deliberate misconduct we consider criminal in other contexts as well.

My views about prosecutorial discretion for environmental crime draw on my experience serving for seventeen years as a federal environmental crimes prosecutor, including seven as Chief of the Environmental Crimes Section when I was responsible for approving all charging decisions in cases brought by my office. The factors track what EPA has identified as significant in its exercise of investigative discretion and draw from the Principles of Federal Prosecution that govern all criminal cases brought by the Justice Department. But my former office does not handle all cases prosecuted under the federal environmental laws—the remainder are prosecuted by United States Attorneys—and the office does not require the presence of any specific aggravating factors to justify criminal charges. As a result, in my prior scholarship, I could not show the extent to which my normative model is descriptive as well.

I therefore created the Environmental Crimes Project to analyze the extent to which the aggravating factors I have identified as normatively desirable were present in recent prosecutions. Over a three-year period, with research assistance from 120 students at the University of Michigan Law School, we reviewed all cases investigated by EPA from 2005–2010. To ensure a representative data set, we focused on defendants charged in federal court with pollution crime or related Title 18 offenses. We conducted our review based on court documents for over 600 cases involving nearly 900 defendants. In addition to analyzing the aggravating factors, we also compiled data regarding the types of defendants charged, the judicial districts and EPA regions involved, the statutes charged, and the outcomes of the cases. In the process, we developed a comprehensive database of information about pol-

lution cases investigated by EPA from 2005–2010 that resulted in federal criminal charges.

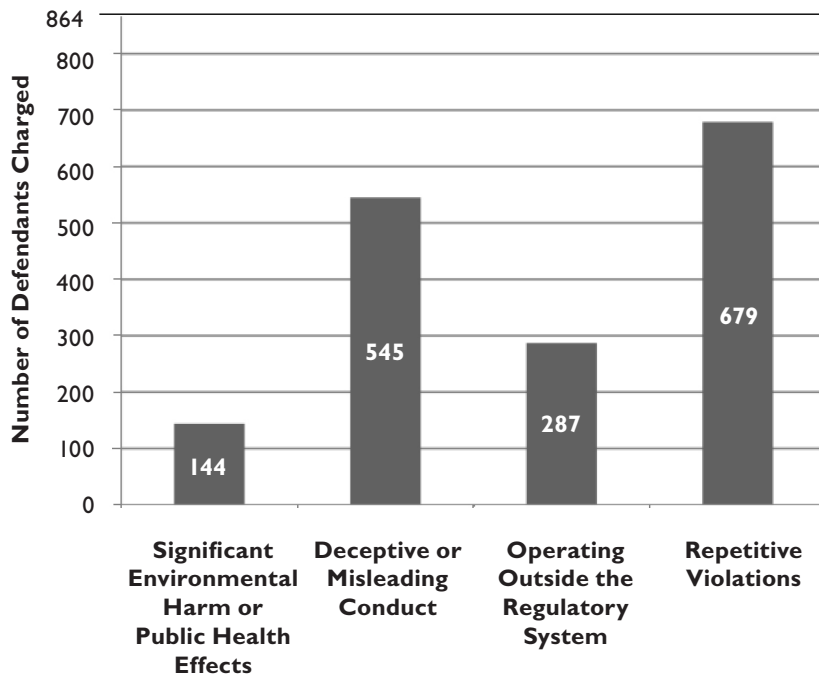
Based on our research, I have determined that one or more aggravating factors were present in 96% of environmental criminal prosecutions from 2005–2010. This finding supports at least two significant conclusions. First, in exercising their discretion to bring criminal charges, prosecutors almost always focus on violations that include one or more of the aggravating factors I have identified. Second, violations that do not include one of those aggravating factors are not likely to be prosecuted criminally. I cannot say whether these aggravating factors will trigger criminal prosecution; declined cases are not public, so we do not have a control group of cases where prosecutors decided not to pursue criminal charges. Nor could we create a comparison group of civil matters, because civil cases involve notice pleading and most are resolved by consent decrees that do not identify whether there were aggravating factors. Indeed, I would expect that civil and administrative cases also involve at least significant harm and repetitive violations (deceptive or misleading conduct, in my experience, is likely to result in a referral for criminal enforcement). Nonetheless, my finding that criminal enforcement is reserved for cases involving at least one of the aggravating factors I have identified should provide greater clarity about the role of environmental criminal enforcement and reduce uncertainty in the regulated community about which environmental violations might lead to criminal charges.

This excerpted version of my article has two Parts. Part I focuses on the presence or absence of the individual aggravating factors in each case. Part II analyzes how often multiple aggravating factors are present and assesses defendants with no aggravating factors. Based on the empirical evidence presented here, I conclude that criminal enforcement has been reserved for violations with the aggravating factors I have identified, which suggests that prosecutors have exercised their discretion in ways that should ameliorate concerns about over-criminalization.

I. The Presence of Individual Aggravating Factors in Environmental Criminal Prosecutions

In this Part, I provide the results of our efforts to determine whether the individual aggravating factors I have identified were present in pollution prosecutions initiated from 2005–2010. We determined that 96% of the defendants (828 out of 864 defendants) engaged in conduct involving at least one of the four aggravating factors. The most prevalent aggravating factors were repetitive violations (78% or 679 defendants) and deceptive or misleading conduct (63% or 545 defendants). The third most common factor was operating outside the regulatory scheme (33% or 287 defendants), followed by defendants who caused significant harm (17% or 144 defendants). These findings are shown in Figure 1 below:

1. See David M. Uhlmann, *Environmental Crime Comes of Age: The Evolution of Criminal Enforcement in the Environmental Regulatory Scheme*, 4 UTAH L. REV. 1223, 1246-52 (2009).

Figure I. Prosecutorial Discretion Factors

These results support two significant conclusions, both of which suggest that criminal enforcement was reserved for culpable conduct under the environmental laws from 2005–2010.

First, one or more aggravating factors are present for nearly all defendants prosecuted under the environmental laws. This is a significant finding in light of over-criminalization claims, since it suggests that criminal enforcement is reserved for conduct involving the aggravating factors that, under my normative model, might warrant criminal prosecution. It also may help address randomness claims about criminal enforcement, since it suggests that prosecutorial discretion may follow a distinctive pattern by focusing on defendants who engage in conduct involving one or more aggravating factors.

Second, it is unlikely that there will be a criminal prosecution if no aggravating factor is present. We identified only a small number of defendants (36) who engaged in conduct that did not involve one of the aggravating factors. This finding suggests that prosecutors are unlikely to pursue criminal charges for violations of the environmental laws that do not involve significant harm, deceptive or misleading conduct, facilities operating outside the regulatory system, or repetitive violations. It also may help mitigate concerns that prosecutors are targeting technical violations and defendants who acted in good faith.

In the Sections that follow, I present data and analysis regarding each of the aggravating factors.²

A. Significant Environmental Harm/Public Health Effects

Cases involving significant environmental harm and public health effects often receive attention from investigators and prosecutors. EPA emphasizes environmental harm and public health effects in its memorandum to investigators regarding the proper exercise of investigative discretion. Prosecutors also focus on these cases for a practical reason—they are more compelling for judges and juries. In white collar cases generally and environmental cases in particular, prosecutors worry that jury nullification may occur if they prove only the elements of the charged offenses without providing juries with a narrative that allows them to view the conduct as morally culpable.

Our study focused on five types of harm: (1) serious bodily injury or death; (2) knowing or negligent endangerment; (3) animal deaths; (4) cleanup costs; and (5) evacuations and emergency responses. At least one of these factors was present for 15% of the defendants in our study (131 of the 864 defendants). Significant environmental harm that did not fit into one of the five factors listed above was present for an additional 13 defendants. Overall, 17% of the defendants included in our study (144 of the 864 defendants) were charged with conduct involving significant environmental harm, a statistically significant percentage but the smallest of the four aggravating factors analyzed.

While our data suggest that significant harm was caused by only one-sixth of the criminal defendants, it merits emphasis that we focused on conduct where harm appeared to be a distinctive “plus” factor in criminal cases. Most pollution crime involves risk of environmental harm or public health effects, since those factors are present whenever pollutants and hazardous wastes are improperly stored, disposed, discharged, or released into the environment. If we had included all potential contamination cases—for example, every CWA discharge case, every RCRA storage and disposal case, and all of the CAA asbestos cases—the harm numbers would have been much higher, involving 73% of all cases (484 out of 664 cases). Stated differently, harm or the potential for harm is present in most environmental cases or they would not be violations at all. Our challenge in examining prosecutorial discretion factors was to identify cases where harm was aggravated and therefore might be a reason the case was criminally prosecuted. It is in this narrower understanding of harm that the number of cases may be limited.

2. We obtained the same results when we analyzed at the case level: nearly 96% of all cases (635 out of 664 cases) involved at least one of the aggravating factors. We also achieved nearly identical results when we analyzed the individual aggravating factors at the case level: 17% for significant harm; 59% for deceptive or misleading conduct; 33% for operating outside the

regulatory system; and 76% for repetitive violations. We present results here and in Part II based on defendants.

B. *Deceptive or Misleading Conduct*

Deceptive or misleading conduct undermines the effectiveness of environmental protection in at least three ways. First, deceptive conduct, such as the use of bypass lines or midnight dumping, can allow illegal pollution to go undetected. Second, the environmental laws largely involve an honor system where companies must seek permits or other authorization for pollution activities and then must monitor and self-report their compliance. When companies do not conduct required monitoring or honestly report their pollution activity, they undermine the self-policing required under the environmental laws. Third, misleading conduct deprives regulators of accurate information about overall levels of pollution, which they need to make informed decisions about what pollution to permit.

I have suggested that lying is the most significant factor in making a criminal case out of what otherwise might be a civil or administrative violation. If this premise is true and a high percentage of criminal cases involve deceptive or misleading conduct, it could address concerns that law-abiding individuals are being unfairly targeted with criminal prosecution. I would argue that individuals who misrepresent facts regarding their compliance with legal requirements are not acting in good faith. Moreover, all corporations and individuals are expected to be honest in their statements and submissions to the government. False statements, concealment, and obstruction of justice are therefore criminal under both the environmental laws and Title 18 of the United States Code.

Over 60% of the defendants included in our study committed violations involving deceptive or misleading conduct (63%, or 544 of 864 defendants). This finding is significant because it suggests that the majority of those charged as environmental criminals engage in conduct that is viewed as culpable in other areas of the criminal law as well. To better understand this factor, we analyzed deceptive or misleading conduct based on whether it occurred during (1) the commission of the underlying offense (e.g., by using a bypass line to circumvent pollution control equipment), (2) reporting or recordkeeping (e.g., falsifying documents to conceal pollution control activity), or (3) a cover-up after the violations occurred (e.g., lying to investigators and destroying evidence of a crime).

More than 36% of the defendants in our study (313 of 864 defendants) engaged in deceptive or misleading conduct in the commission of their violations. Nearly 39% of the defendants in our study (336 of 864 defendants) engaged in deceptive or misleading conduct when submitting required reports of pollution activity or in maintaining required compliance records. More than 24% of the defendants (209 of 864 defendants) engaged in some type of after-the-fact effort to conceal violations from regulators.

Perhaps as significantly, nearly one-half of the defendants engaging in deceptive or misleading conduct did so in multiple ways. Of the 544 defendants who engaged in deceptive or misleading conduct, 106 defendants were

involved solely in deception during the commission of the offense, 123 defendants were involved in deception solely during reporting or recordkeeping, and 80 defendants were engaged in deceptive conduct solely during cover-up activity. The remaining 236 defendants, or 43%, were engaged in two or more types of deceptive activity.

Deceptive or misleading conduct inculcates both for its own sake—both law and ethics demand that we be truthful—and because of what it reveals about the mental state of the majority of criminal defendants in environmental cases. It has long been argued that the complexity of the environmental laws lays a trap for the uninformed, and that reduced mental state requirements compound the problem by criminalizing conduct that defendants had no idea was unlawful, let alone criminal. Our study's findings concerning the prevalence of deceptive or misleading conduct do not mean that the environmental laws are not complex or that their criminal provisions are not far reaching. The fact that so many of the defendants charged as environmental criminals engaged in deceptive or misleading conduct, however, may undercut the argument that the government is prosecuting individuals who make good-faith efforts to comply and do not engage in any culpable behavior.

C. *Operating Outside the Regulatory System*

The third factor that I have argued may warrant criminal enforcement involves companies that operate outside the regulatory scheme. Like many modern statutory schemes, the environmental laws impose substantial regulatory requirements on facilities across the United States. It is no longer credible for companies to claim ignorance of the fact that their conduct may be regulated. Companies that participate in the regulatory system do so at substantial cost and should not be at a competitive disadvantage when compared to companies that fail to meet their legal obligations. In addition, as noted earlier, the government depends upon complete and accurate information about pollution activity in order to operate an effective permitting system. When companies fail to participate in the regulatory system, the government has no mechanism for taking into account their pollution activity, leading to a lack of information that could undermine environmental protection efforts.

Whether such behavior warrants criminal enforcement, of course, is a separate question from whether the government must take enforcement action to promote compliance efforts. In some instances, criminal enforcement may be appropriate. If a company transports hazardous waste to facilities that are not permitted to receive it, for example, there is a significant potential that the waste will be stored unsafely or disposed of illegally. Likewise, if a company stores or disposes of hazardous waste without a permit, there is a correspondingly significant risk that the public may be exposed to harmful hazardous waste and that toxic pollutants will contaminate the environment. Conversely, civil or administrative enforcement may be more appropriate when the failure to operate within the regulatory system

involves notification or recordkeeping requirements, or if there is evidence that a defendant failed to comply with permitting requirements because of a good-faith misunderstanding about whether its activities were regulated.

Nearly one-third of the defendants charged with environmental crimes operated outside the regulatory system (33% or 287 out of 864 defendants). Of those 287 defendants, 85% failed to obtain permits required under the environmental laws or transported hazardous wastes to facilities that were not permitted to receive hazardous waste. Slightly less than 15% of defendants who operated outside the regulatory system failed to maintain required records; 5.6% of those defendants failed to monitor for pollution activity, and 30% failed to report pollution.

Significantly, most defendants charged with failure to maintain records, failure to monitor, or failure to report also committed another subcategory of violation. Only one defendant over the six-year period covered by the study was charged solely with recordkeeping violations, and only three defendants were charged solely with failure to monitor violations. The numbers were higher for failure to report pollution activity, including 18 defendants or approximately 2% of all defendants charged with environmental crime. In contrast, there were 184 defendants charged solely with either failure to obtain a permit or permit violations, accounting for 21% of all defendants.

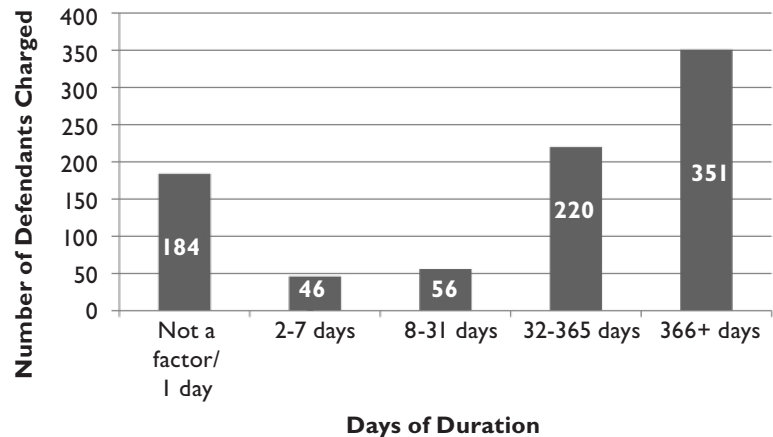
The overwhelming number of defendants charged with permit violations—both alone and in combination with other acts properly characterized as operating outside the regulatory system—suggests that prosecutors have exercised their discretion to focus on the type of actions that most undermine the regulatory system and generally do not prosecute when the violations are more technical.

D. Repetitive Violations

The fourth category of cases that I have asserted might be appropriate for criminal prosecution is repetitive violations. We focused on the duration of the charged misconduct and of any other relevant conduct to identify the extent to which criminal charges were based on repetitive violations. We considered two types of repetitive violations to be potentially aggravating: first, single violations that were egregious enough that they continued for multiple days, weeks, months, or years; and, second, multiple violations that occurred over a period of days, weeks, months, or years.

More than three-quarters of the defendants in our database committed violations that lasted more than a day (79% or 679 out of 864 defendants). We then sorted to determine how many of those defendants committed violations that either lasted more than a week, more than a month, or more than a year or that had harmful effects over a comparable period of time. We found that the largest number of defendants who engaged in repetitive conduct

Figure 2. Repetitive Violations by Duration



committed violations that lasted more than a year (41% or 351 defendants who engaged in repetitive violations). The results for duration of violations are summarized in Figure 2, above.

These findings admit to competing interpretations about the significance of repetitive violations. On the one hand, as noted above, more than three-quarters of the defendants committed violations that lasted more than one day. Of that group, 84% committed violations that lasted more than one month and 52% committed violations that lasted more than one year. Those findings suggest that duration is often an aggravating factor in environmental criminal prosecutions—and that most defendants commit violations over a period of months or years.

On the other hand, more than a fifth of defendants (21%) committed violations that occurred on a single day. Indeed, just over one-quarter of all defendants (27%) committed violations that did not last more than one week. Those findings suggest that, while environmental criminal cases most often involve violations lasting a month or longer, a significant percentage of cases involve violations of relatively limited duration.

We examined the single-day defendants more closely to determine whether factors were present that might explain why isolated misconduct resulted in criminal charges. We determined that 80% of the defendants engaged in misconduct that involved at least one of the other aggravating factors, with 50% of the defendants engaged in deceptive or misleading conduct. The presence of those aggravating factors might be sufficient to justify criminal prosecution. Moreover, the fact that charges are focused on a single day does not mean that the misconduct was limited to a single day; prosecutors may have agreed to charge a single day of violation as part of a plea agreement. Nonetheless, cases involving isolated misconduct merit caution; an isolated violation should be more egregious to warrant criminal enforcement.³

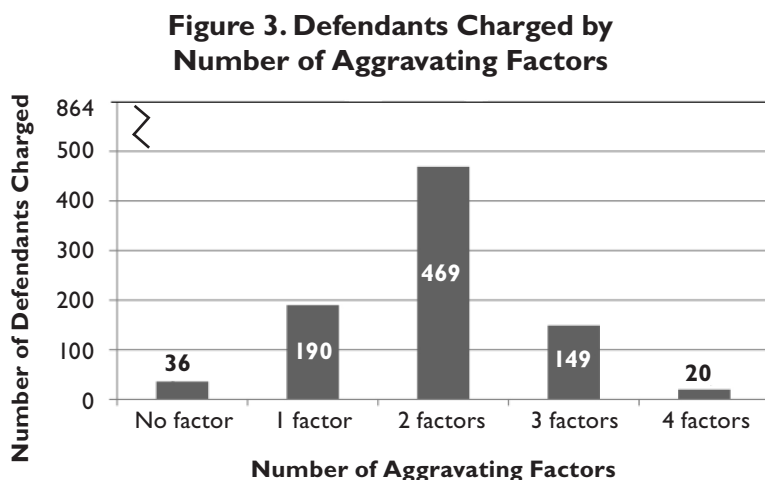
3. There were 36 defendants who did not commit repetitive violations who also did not engage in conduct involving any of the other aggravating factors. The charges for these defendants fall outside my normative model. I analyze them in Part II, Section B *infra*, to determine whether or not they appear to be marginal cases for criminal prosecution.

II. Analysis of the Relationship Between Aggravating Factors and Prosecutorial Discretion

In this Part, I analyze the data regarding the presence of aggravating factors in environmental prosecutions from two perspectives. First, I analyze how often multiple aggravating factors were present in the database and whether there appears to be any relationships among the factors. Second, I examine cases with no aggravating factors to determine whether they reveal marginal cases.

A. Multiple Aggravating Factors and the Relationships Between Aggravating Factors

As Part I explained, aggravating factors were present for 96% of the defendants in our six-year dataset (828 out of 864 defendants). To better understand the role of these aggravating factors, I also analyzed how often multiple factors were present and considered the relationship between factors. Two or more aggravating factors were present for 74% of the defendants (638 out of 864 defendants). The fact that such a high percentage of defendants had multiple aggravating factors suggests a higher level of egregiousness than would be present if most defendants had only a single aggravating factor. Our data regarding the number of aggravating factors is presented in Figure 3:



An analysis of these data supports three additional findings regarding the aggravating factors in environmental crimes.

First, one of the first three factors (all factors other than repetitiveness) was present for 88% of the defendants (761 out of 864 defendants). In other words, most defendants were charged for violations that involved harm, deceptive or misleading conduct, or operating outside the regulatory scheme. These findings may suggest a further refinement of my overall conclusions from Part I: (1) in most instances, prosecutors have reserved criminal prosecution for defendants with one of the first three aggravating factors; and (2) defendants who engage in conduct that does

not involve one of the first three factors are unlikely to face criminal charges.

Second, repetitiveness often is present when criminal charges are brought but rarely is the sole aggravating factor. Repetitiveness was the most prevalent of the four factors, accounting for 79% of the defendants (679 out of 864 defendants). Repetitiveness was the sole aggravating factor, however, for only 10% of the defendants who committed repetitive violations (67 out of 679 defendants), which is the lowest for any aggravating factor.⁴ Stated differently, 90% of the defendants who committed repetitive violations (612 out of 679 defendants) also had at least one other aggravating factor. These findings suggest that, while prosecutors may prefer to charge repetitive violations, repetitiveness alone may not be driving charging decisions.

Third, more than 71% of defendants (612 out of 864 defendants) engaged in conduct that involved one of the first three factors (significant harm, deceptive conduct, operating outside the regulatory system) and repetitiveness. Since most environmental crimes involve one of the first three aggravating factors (88% of all defendants) and most environmental crimes involve repetitive violations (79% of all defendants), we would expect to see one of the first three factors present along with repetitiveness in a high percentage of cases. But the relationship was even stronger when we looked at multi-factor defendants. Repetitiveness was present for 96% of the defendants with two or more aggravating factors (612 out of 638 defendants). For defendants with two factors, repetitiveness was present for 94% of the defendants (443 out of 469 defendants).⁵ The pairing of repetitiveness with one or more of the other aggravating factors was the most dominant multi-factor relationship when calculated as a percentage of all defendants (71% of all defendants).⁶ This finding suggests that prosecutors often reserve criminal prosecution for violations that involve both one of the first three factors and repetitiveness and are less likely to bring criminal charges if that relationship is absent.

We found evidence of other relationships among the aggravating factors. Deceptive or misleading conduct occurred least frequently in combination with the factors of significant harm and operating outside the regulatory system. We found 545 defendants who engaged in deceptive or misleading conduct; only 11% of those defendants (58 defendants) engaged in conduct that resulted in significant harm. In

4. Operating outside the regulatory system also is the sole aggravating factor in only 11% of the cases where it is present (30 out of 281 defendants). In contrast, deceptive or misleading conduct is the sole aggravating factor for 36% of the defendants who engaged in deceptive or misleading conduct (136 out of 547 defendants).

5. Of course, most defendants in our dataset committed repetitive violations, so I would expect to see a significant overlap between repetitive violations and other factors. Still, it is revealing that the other three factors were present so often and that repetitiveness appeared by itself so infrequently.

6. The combination of one of the first three factors and repetitiveness also is the most dominant relationship as a percentage of all cases, accounting for 68% of all cases in the dataset (450 out of 664 cases).

other words, significant harm was present as a percentage of defendants involved in deceptive or misleading conduct less frequently than in our dataset as a whole (17% of all defendants). More of the defendants who engaged in deceptive or misleading conduct were operating outside the regulatory system (21% or 117 defendants) but a relatively modest amount overall and, as with harm, less often than in our dataset as a whole (where it was present for 33% of all defendants).

Deceptive or misleading conduct was present as the sole aggravating factor more often than it was paired with significant harm. Deceptive or misleading conduct was the sole aggravating factor for 14% of the defendants who engaged in deceptive or misleading conduct (78 out of 545 defendants). For defendants who had only one aggravating factor, deceptive or misleading conduct appeared more often than any other aggravating factor both in raw numbers (the next largest category was repetitive violations, which was the sole aggravating factor for 67 defendants) and as a percentage of defendants possessing that factor (the next largest category was significant harm at 11% of all significant harm defendants). As with other aggravating factors, most defendants who engaged in deceptive or misleading conduct also committed repetitive violations (83% or 452 out of 545 defendants), which suggests that deceptive or misleading conduct is charged most often when it occurs more than once. It merits emphasis, though, that deceptive and misleading conduct was charged most often as a standalone factor—and appeared the most often of the first three aggravating factors. As noted previously, in my experience, deceptive or misleading conduct is the most significant factor in the exercise of prosecutorial discretion.

Conversely, we found that there appeared to be at least some positive relationship between significant harm and operating outside the regulatory system. The correlation was not particularly strong: we saw both significant harm and operating outside the regulatory system for 60 defendants (41% of significant harm defendants and 21% of defendants operating outside the regulatory system). Yet both were present slightly more often together than they were present in the dataset as a whole (operating outside the regulatory system was present for 33% of all defendants; significant harm was present for 17% of all defendants). In addition, even a modest correlation between significant harm and operating outside the regulatory system may be noteworthy, since the regulatory system seeks to protect public health and the environment from harm (and the risk of harm).

B. Defendants With No Aggravating Factors Present

For 36 of the defendants in our database, we determined that none of the four aggravating factors was present. We examined each case individually to determine whether, based on the conduct described in the court documents, any involved questionable exercise of prosecutorial discretion.

For the 36 defendants with no aggravating factors, 17 defendants committed violations that, while insufficient to code as “operating outside the regulatory system,” nonetheless involved core subcategory violations such as failing to obtain a permit. For example, in nearly all of the RCRA cases in the database, the defendant engaged in conduct that at least involved failing to acquire the requisite permit, which is a subset of culpability under operating outside the regulatory system. But not all of those defendants were coded as operating outside the regulatory system because they might have been partially operating within the regulatory system.

Perhaps there might be circumstances where the failure to obtain a permit reflected good-faith misunderstanding of the permitting requirement or, in the RCRA context, the definition of hazardous waste. In those circumstances, prosecutors might choose to exercise their discretion to decline prosecution in favor of civil or administrative enforcement. By itself, however, there is nothing about prosecution for failure to obtain regulatory permits that signals prosecutorial overreaching. The obligation to acquire and maintain valid permits for pollution activity or to store and dispose of hazardous waste is not an arcane or obscure regulatory requirement.

Only 19 defendants engaged in conduct that was not captured by any category or subcategory. We analyzed each of these cases and found that researchers had noted explanatory “additional aggravating factors” that may have influenced prosecutors for six defendants. For example, one prosecution involved safety violations occurring in schools, which may have prompted the prosecutor to pursue criminal charges. Another prosecution involved conduct that appeared to blatantly disregard the law but was not captured by one of the aggravating factors.

As a result, most prosecutions with no aggravating factors involved either a subcategory of operating outside the regulatory system or an additional aggravating factor. Only 13 defendants engaged in conduct where prosecution could not be justified by a subcategory or additional aggravating factor. Of that number, nine defendants were charged in an indictment or information that merely recited the elements of the offense. It is far easier to identify aggravating factors in so-called speaking indictments, where prosecutors provided additional details about the misconduct, including the type of evidence that fit within the aggravating factor analysis.

Under the Federal Rules of Criminal Procedure, however, only the elements of the offense must be included in an indictment, and pleading practices vary from district to district. In the absence of speaking indictments, we looked to other documents to determine whether aggravating factors were present (e.g., plea agreements, factual basis statements, sentencing memoranda, and judgments) but those documents sometimes did not exist or did not provide additional information beyond the charges. Perhaps some of the nine defendants who were charged in “bare-bones” indictments or informations did not engage in conduct

that involved any aggravating factors. If so, those could be marginal criminal cases; we cannot tell from the court documents. Other than those nine defendants, however, there are only four defendants for whom we could not discern a rationale for the prosecution despite the availability of court documents that provided details about their misconduct. Those four defendants were charged with negligence on a single day, which may involve conduct where civil charges may have been more appropriate. Nonetheless, four defendants is an extremely small percentage of the 864 defendants in our database.

III. Conclusion

More than three decades after EPA hired its first criminal investigators, the prosecution of environmental crime remains the source of persistent claims about over-criminalization and lingering questions about the role of criminal enforcement under the environmental laws. Given the broad discretion that prosecutors have under the environmental laws—and the erosion of bipartisan support for environmental protection—those expressions of concern are not surprising. But they point to the need for a stronger normative framework and a better empirical understanding of criminal enforcement.

I have argued that criminal prosecution would be most appropriate when one or more aggravating factors were present: significant environmental harm or public health effects, deceptive or misleading conduct, operating outside the regulatory system, and repetitive violations. My empirical research now strongly suggests that criminal enforcement has been limited in most instances to violations involving one or more of those aggravating factors. In 96% of the environmental prosecutions from 2005–2010, at least one aggravating factor was present. In more than 88% of those environmental prosecutions, the defendants caused significant harm, engaged in deceptive or misleading conduct, or operated outside the regulatory system that protects the environment and public health. In nearly three-quarters of the cases, two or more aggravating factors were present, with repetitiveness most often the additional aggravating factor. These findings suggest that prosecutors have reserved criminal enforcement for egregious misconduct.

Moreover, the extent to which environmental criminals engage in deceptive and misleading conduct—more

than 63% of those prosecuted from 2005–2010—may undermine claims that environmental defendants are well-intentioned individuals inadvertently snared by complex regulations and a criminal enforcement scheme with reduced mental state requirements. The environmental regulatory system depends upon honest self-reporting; those who lie to conceal violations are engaging in culpable behavior that cripples efforts to protect the environment and the public from the risks associated with unlawful pollution. These findings take on added significance because one-third of the defendants in our study were operating entirely outside the regulatory scheme, making no effort to comply with the law. Criminal enforcement is appropriate for defendants who deceive or seek to operate outside the law, particularly when their conduct risks or causes significant harm to the environment and public health.

There were some cautionary notes revealed by our study: 4% of the defendants engaged in conduct that involved no aggravating factors, and a small number of those defendants were charged in what appear to be pure negligence cases. Cases without aggravating factors and those involving pure negligence should receive extra scrutiny from prosecutors to ensure that criminal prosecution is appropriate. In addition, approximately one-fifth of all defendants engaged in conduct that occurred on a single day. Of course, a violation on a single day could be egregious enough to warrant criminal prosecution; in most single-day matters, an aggravating factor other than repetitiveness was present. Nonetheless, the most compelling prosecutions typically involve repeated misconduct, which compounds the wrongdoing and limits any doubt about the defendant's intent.

Overall, however, my research should reduce uncertainty about which environmental violations may result in criminal prosecution and quiet concerns about over-criminalization. Prosecutors appear to be focusing on conduct that involves the aggravating factors that I have identified; when those factors are absent, criminal prosecution is unlikely to occur. Prosecutors thus have reserved criminal prosecution for culpable conduct and avoided charges based on technical violations or when defendants acted in good faith. Perhaps most importantly, my research provides empirical evidence that prosecutors have properly exercised their broad discretion under the environmental laws and assured an appropriate role for criminal enforcement in our environmental protection system.

RECENT DEVELOPMENTS

In the Congress

“In the Congress” entries cover activities reported in the *Congressional Record* from June 1, 2015, through June 30, 2015. Entries are arranged by bill number, with Senate bills listed first. “In the Congress” covers all environment-related bills that are introduced, reported out of committee, passed by either house, or signed by the president. “In the Congress” also covers all environmental treaties ratified by the Senate. This material is updated monthly. For archived materials, visit <http://elr.info/legislative/congressional-update/archive>.

Chamber Action

S. 611 (water), which would amend the SDWA to reauthorize technical assistance to small public water systems, was passed by the Senate. 161 Cong. Rec. S3975 (daily ed. June 9, 2015).

S. 653 (water), which would amend the Water Resources Research Act to reauthorize grants for and require applied water supply research regarding the water resources research and technology institutes established under that Act, was passed by the Senate. 161 Cong. Rec. S3975 (daily ed. June 9, 2015).

S. Res. 203 (wildlife), which would designate June 20, 2015, as “American Eagle Day” to celebrate the recovery and restoration of the bald eagle, was passed by the Senate. 161 Cong. Rec. S4250 (daily ed. June 17, 2015).

H.R. 404 (water), which would authorize early repayment of obligations to the Bureau of Reclamation within the Northport Irrigation District in Nebraska, was passed by the House. 161 Cong. Rec. H3586 (daily ed. June 1, 2015).

H.R. 533 (governance), which would revoke the charter of incorporation of the Miami Tribe of Oklahoma at the request of that tribe, was passed by the House. 161 Cong. Rec. H3588 (daily ed. June 1, 2015).

H.R. 533 (governance), which would revoke the charter of incorporation of the Miami Tribe of Oklahoma at the

request of that tribe, was passed by the Senate. 161 Cong. Rec. S4608 (daily ed. June 24, 2015).

H.R. 944 (water), which would reauthorize the National Estuary Program, was passed by the House. 161 Cong. Rec. H3618 (daily ed. June 1, 2015).

H.R. 979 (land use), which would designate a mountain in the John Muir Wilderness of the Sierra National Forest as “Sky Point,” was passed by the House. 161 Cong. Rec. H3589 (daily ed. June 1, 2015).

H.R. 1335 (wildlife), which would amend the Magnuson-Stevens Fishery Conservation and Management Act to provide flexibility for fishery managers and stability for fishermen, was passed by the House. 161 Cong. Rec. H3591 (daily ed. June 1, 2015).

H.R. 1493 (governance), which would protect and preserve international cultural property at risk due to political instability, armed conflict, or natural or other disasters, was passed by the House. 161 Cong. Rec. H3627 (daily ed. June 1, 2015).

H.R. 2394 (natural resources), which would reauthorize the National Forest Foundation Act, was passed by the House. 161 Cong. Rec. H3931 (daily ed. June 9, 2015).

H.R. 2576 (toxic substances), which would modernize TSCA, was passed by the House. 161 Cong. Rec. H4581 (daily ed. June 23, 2015).

Committee Action

S. 544 (governance) was reported by the Committee on Environment and Public Works. S. Rep. No. 114-69, 161 Cong. Rec. S4345 (daily ed. June 22, 2015). The bill would prohibit EPA from proposing, finalizing, or disseminating regulations or assessments based upon science that is not transparent or reproducible.

S. 697 (toxic substances) was reported by the Committee on Environment and Public Works. S. Rep. No. 114-67, 161 Cong. Rec. S4249 (daily ed. June 17, 2015). The bill would amend TSCA to reauthorize and modernize the Act.

S. 1180 (natural resources) was reported by the Committee on Homeland Security and Governmental Affairs. S. Rep. No. 114-73, 161 Cong. Rec. S2688 (daily ed. June 25, 2015). The bill would amend the Homeland Security Act to direct FEMA to modernize the integrated public alert and warning system.

S. 1645 (governance) was reported by the Committee on Appropriations. S. Rep. No. 114-70, 161 Cong. Rec. S4544 (daily ed. June 23, 2015). The bill would make appropriations for DOI, EPA, and related agencies for the fiscal year ending September 30, 2016.

H.R. 23 (natural resources) was reported by the Committee on Commerce, Science, and Transportation. S. Rep. No. 114-62, 161 Cong. Rec. S4103 (daily ed. June 11, 2015). The bill

would reauthorize the National Wind-storm Impact Reduction Program.

H.R. 387 (governance) was reported by the Committee on Natural Resources. H. Rep. No. 114-173, 161 Cong. Rec. H4591 (daily ed. June 23, 2015). The bill would provide for certain land to be taken into trust for the benefit of Morongo Band of Mission Indians.

H.R. 712 (governance) was reported by the Committee on Judiciary. H. Rep. No. 114-184, 161 Cong. Rec. H4768 (daily ed. June 25, 2015). The bill would impose certain limitations on consent decrees and settlement agreements by agencies that require the agencies to take regulatory action in accordance with their terms.

H.R. 906 (energy) was reported by the Committee on Energy and Commerce. H. Rep. No. 114-142, 161 Cong. Rec. H4000 (daily ed. June 9, 2015). The bill would modify the efficiency standards for grid-enabled water heaters.

H.R. 1214 (natural resources) was reported by the Committee on Agriculture and Committee on Natural Resources. H. Rep. No. 114-140, 161 Cong. Rec. H3921 (daily ed. June 8, 2015). The bill would amend the Small Tracts Act to expand the authority of USDA to sell or exchange small parcels of National Forest System land to enhance the management of the National Forest System and resolve minor encroachments.

H.R. 1734 (waste) was reported by the Committee on Energy and Commerce. H. Rep. No. 114-143, 161 Cong. Rec. H4000 (daily ed. June 9, 2015). The bill would amend the Solid Waste Disposal Act to encourage recovery and beneficial use of coal combustion residuals and establish requirements for the proper management and disposal of coal combustion residuals that are protective of human health and the environment.

H.R. 1991 (land use) was reported by the Committee on Natural Resources and Committee on Agriculture. H. Rep. No. 114-151, 161 Cong. Rec. H4342 (daily ed. June 12, 2015). The bill would extend the authority of DOI

and USDA to carry out the Federal Lands Recreation Enhancement Act.

H.R. 2042 (climate change) was reported by the Committee on Energy and Commerce. H. Rep. No. 114-171, 161 Cong. Rec. H4546 (daily ed. June 19, 2015). The bill would allow for judicial review of any final rule addressing carbon dioxide emissions from existing fossil fuel-fired electric utility-generating units before requiring compliance with such rule, and allow states to protect households and businesses from significant adverse effects on electricity ratepayers or reliability.

H.R. 2393 (land use) was reported by the Committee on Agriculture. H. Rep. No. 114-131, 161 Cong. Rec. H4001 (daily ed. June 9, 2015). The bill would amend the Agricultural Marketing Act to repeal country-of-origin labeling requirements with respect to beef, pork, and chicken.

H.R. 2394 (natural resources) was reported by the Committee on Agriculture. H. Rep. No. 114-138, 161 Cong. Rec. H1163 (daily ed. June 4, 2015). The bill would reauthorize the National Forest Foundation Act.

H.R. 2576 (toxic substances) was reported by the Committee on Energy and Commerce. H. Rep. No. 114-175, 161 Cong. Rec. H4591 (daily ed. June 23, 2015). The bill would modernize TSCA.

H.R. 2647 (natural resources) was reported by the Committee on Agriculture and Committee on Natural Resources. H. Rep. No. 114-185, 161 Cong. Rec. H4768 (daily ed. June 25, 2015). The bill would expedite NEPA review to improve forest management activities in units of the National Forest System derived from the public domain, on public lands under the jurisdiction of BLM, and on tribal lands to return resilience to overgrown, fire-prone forested lands.

H.R. 2822 (governance) was reported by the Committee on Appropriations. H. Rep. No. 114-170, 161 Cong. Rec. H4541 (daily ed. June 18, 2015). The bill would make appropriations for DOI, EPA, and related agencies for the fiscal year ending September 30, 2016.

Bills Introduced

S. 1479 (Inhofe, R-Okla.) (waste) would amend CERCLA to modify provisions relating to grants. 161 Cong. Rec. S3456 (daily ed. June 2, 2015). The bill was referred to the Committee on Environment and Public Works.

S. 1481 (Durbin, D-Ill.) (natural resources) would direct FEMA to enter into an agreement with the National Academy of Sciences to conduct a study on urban flooding. 161 Cong. Rec. S3456 (daily ed. June 2, 2015). The bill was referred to the Committee on Banking, Housing, and Urban Affairs.

S. 1483 (Alexander, R-Tenn.) (land use) would direct DOI to study the suitability and feasibility of designating the James K. Polk Home in Columbia, Tennessee, as a unit of the National Park System. 161 Cong. Rec. S3456 (daily ed. June 2, 2015). The bill was referred to the Committee on Energy and Natural Resources.

S. 1485 (Baldwin, D-Wis.) (water) would provide for the advancement of energy-water efficiency research, development, and deployment activities. 161 Cong. Rec. S3456 (daily ed. June 2, 2015). The bill was referred to the Committee on Energy and Natural Resources.

S. 1500 (Crapo, R-Idaho) (water) would clarify congressional intent regarding regulation of the use of pesticides in or near navigable waters. 161 Cong. Rec. S3678 (daily ed. June 3, 2015). The bill was referred to the Committee on Environment and Public Works.

S. 1503 (Blumenthal, D-Conn.) (governance) would provide for enhanced federal efforts concerning prevention, education, treatment, and research activities related to Lyme disease and other tick-borne illnesses, including the establishment of a Tick-Borne Diseases Advisory Committee. 161 Cong. Rec. S3775 (daily ed. June 4, 2015). The bill was referred to the Committee on Health, Education, Labor, and Pensions.

- S. 1510 (Murray, D-Wash.) (land use)** would designate and expand wilderness areas in Olympic National Forest in Washington and designate certain rivers in Olympic National Forest and Olympic National Park as wild and scenic rivers. 161 Cong. Rec. S3776 (daily ed. June 4, 2015). The bill was referred to the Committee on Energy and Natural Resources.
- S. 1511 (Vitter, R-La.) (waste)** would promote the recycling of vessels in the United States. 161 Cong. Rec. S3776 (daily ed. June 4, 2015). The bill was referred to the Committee on Commerce, Science, and Transportation.
- S. 1516 (Collins, R-Me.) (energy)** would modify the energy tax credit to provide greater incentives for industrial energy efficiency. 161 Cong. Rec. S3776 (daily ed. June 4, 2015). The bill was referred to the Committee on Finance.
- S. 1523 (Whitehouse, D-R.I.) (water)** would amend the CWA to reauthorize the National Estuary Program. 161 Cong. Rec. S3860 (daily ed. June 8, 2015). The bill was referred to the Committee on Environment and Public Works.
- S. 1528 (Hirono, D-Haw.) (energy)** would improve energy savings by DOD. 161 Cong. Rec. S3925 (daily ed. June 9, 2015). The bill was referred to the Committee on Armed Services.
- S. 1533 (Barrasso, R-Wyo.) (water)** would authorize DOI to coordinate federal and state permitting processes related to the construction of new surface water storage projects on lands under the jurisdiction of DOI and USDA, and to designate the Bureau of Reclamation as the lead agency for permit processing. 161 Cong. Rec. S3925 (daily ed. June 9, 2015). The bill was referred to the Committee on Energy and Natural Resources.
- S. 1541 (Lee, R-Utah) (land use)** would grant states authority for most taxing and spending for highway and mass transit programs. 161 Cong. Rec. S4021 (daily ed. June 10, 2015). The bill was referred to the Committee on Finance.
- S. 1548 (Whitehouse, D-R.I.) (climate change)** would amend the Internal Revenue Code to provide for carbon dioxide and other greenhouse gas emission fees, reduce the rate of the corporate income tax, provide tax credits to workers, and deliver benefits to retired and disabled Americans. 161 Cong. Rec. S4021 (daily ed. June 10, 2015). The bill was referred to the Committee on Finance.
- S. 1552 (Daines, R-Mont.) (water)** would authorize the Dry-Redwater Regional Water Authority System and the Musselshell-Judith Rural Water System in Montana. 161 Cong. Rec. S4103 (daily ed. June 11, 2015). The bill was referred to the Committee on Energy and Natural Resources.
- S. 1554 (Cardin, D-Md.) (water)** would amend the CWA and direct DOI to conduct a study with respect to stormwater runoff from oil and gas operations. 161 Cong. Rec. S4103 (daily ed. June 11, 2015). The bill was referred to the Committee on Environment and Public Works.
- S. 1573 (Thune, R-S.D.) (natural resources)** would establish regional weather forecast offices. 161 Cong. Rec. S4137 (daily ed. June 15, 2015). The bill was referred to the Committee on Commerce, Science, and Transportation.
- S. 1577 (Tester, D-Mont.) (land use)** would designate certain segments of East Rosebud Creek in Carbon County, Montana, as components of the Wild and Scenic Rivers System. 161 Cong. Rec. S4137 (daily ed. June 15, 2015). The bill was referred to the Committee on Energy and Natural Resources.
- S. 1581 (Casey, D-Pa.) (energy)** would foster market development of clean energy fueling facilities by steering infrastructure installation toward designated clean vehicle corridors. 161 Cong. Rec. S4202 (daily ed. June 16, 2015). The bill was referred to the Committee on Environment and Public Works.
- S. 1584 (Cassidy, R-La.) (energy)** would repeal the renewable fuel standard. 161 Cong. Rec. S4202 (daily ed. June 16, 2015). The bill was referred to the Committee on Environment and Public Works.
- S. 1586 (Kirk, R-Ill.) (water)** would amend the CWA to prohibit the dumping of sewage into the Great Lakes. 161 Cong. Rec. S4202 (daily ed. June 16, 2015). The bill was referred to the Committee on Environment and Public Works.
- S. 1589 (Warner, D-Va.) (governance)** would facilitate efficient investment in and financing of infrastructure projects through the establishment of an Infrastructure Financing Authority. 161 Cong. Rec. S4202 (daily ed. June 16, 2015). The bill was referred to the Committee on Finance.
- S. 1591 (Tester, D-Mont.) (governance)** would provide a pathway for temporary seasonal employees in federal land management agencies to compete for vacant permanent positions under internal merit promotion procedures. 161 Cong. Rec. S4249 (daily ed. June 17, 2015). The bill was referred to the Committee on Homeland Security and Governmental Affairs.
- S. 1592 (Flake, R-Ariz.) (land use)** would clarify the description of certain federal land under the Northern Arizona Land Exchange and Verde River Basin Partnership Act to include additional land in the Kaibab National Forest. 161 Cong. Rec. S4249 (daily ed. June 17, 2015). The bill was referred to the Committee on Energy and Natural Resources.
- S. 1601 (Whitehouse, D-R.I.) (climate change)** would establish an integrated national approach to respond to ongoing and expected effects of extreme weather and climate change by protecting, managing, and conserving fish, wildlife, and plants, and to maximize government efficiency and reduce costs, in cooperation with state, local, and tribal governments. 161 Cong. Rec. S4250 (daily ed. June 17, 2015). The bill was referred to the Committee on Environment and Public Works.
- S. 1626 (Wicker, R-Miss.) (governance)** would reauthorize federal support for passenger rail programs, improve safety, and streamline rail project delivery. 161 Cong. Rec. S4298 (daily

ed. June 18, 2015). The bill was referred to the Committee on Commerce, Science, and Transportation.

S. 1642 (Boozman, R-Ark.) (water) would reduce costs of providing high-quality drinking water to millions of people residing in rural communities by facilitating greater use of cost-effective alternative systems, including well water systems. 161 Cong. Rec. S4346 (daily ed. June 22, 2015). The bill was referred to the Committee on Environment and Public Works.

S. 1645 (Murkowski, R-Alaska) (governance) would make appropriations for DOI, EPA, and related agencies for the fiscal year ending September 30, 2016. 161 Cong. Rec. S4544 (daily ed. June 23, 2015). The bill was referred to the Committee on Appropriations.

S. 1656 (Coons, D-Del.) (governance) would amend the Internal Revenue Code to extend the publicly traded partnership-ownership structure to energy power-generation projects and transportation fuels. 161 Cong. Rec. S4601 (daily ed. June 24, 2015). The bill was referred to the Committee on Finance.

S. 1657 (Barrasso, R-Wyo.) (governance) would amend the Reclamation Safety of Dams Act. 161 Cong. Rec. S4601 (daily ed. June 24, 2015). The bill was referred to the Committee on Energy and Natural Resources.

S. 1671 (Bennet, D-Colo.) (natural resources) would reauthorize the National Forest Foundation Act. 161 Cong. Rec. S4602 (daily ed. June 24, 2015). The bill was referred to the Committee on Agriculture, Nutrition, and Forestry.

S. 1674 (Gillibrand, D-N.Y.) (water) would amend and reauthorize certain provisions relating to Long Island Sound restoration and stewardship. 161 Cong. Rec. S4602 (daily ed. June 24, 2015). The bill was referred to the Committee on Environment and Public Works.

S. 1679 (Heller, R-Nev.) (natural resources) would amend the Flood Disaster Protection Act to require that certain buildings and personal prop-

erty be covered by flood insurance. 161 Cong. Rec. S4648 (daily ed. June 25, 2015). The bill was referred to the Committee on Banking, Housing, and Urban Affairs.

S. 1690 (Cantwell, D-Wash.) (land use) would establish the Mountains to Sound Greenway National Heritage Area in Washington. 161 Cong. Rec. S4648 (daily ed. June 25, 2015). The bill was referred to the Committee on Energy and Natural Resources.

S. 1691 (Barrasso, R-Wyo.) (natural resources) would expedite and prioritize forest management activities to achieve ecosystem restoration objectives. 161 Cong. Rec. S4648 (daily ed. June 25, 2015). The bill was referred to the Committee on Energy and Natural Resources.

S. 1694 (Cantwell, D-Wash.) (water) would authorize Phase III of the Yakima River Basin water enhancement project for the purposes of improving water management in the Yakima River Basin. 161 Cong. Rec. S4648 (daily ed. June 25, 2015). The bill was referred to the Committee on Energy and Natural Resources.

S. 1696 (Isakson, R-Ga.) (land use) would redesignate the Ocmulgee National Monument in Georgia and revise the monument's boundaries. 161 Cong. Rec. S4648 (daily ed. June 25, 2015). The bill was referred to the Committee on Energy and Natural Resources.

S. 1699 (Wyden, D-Or.) (land use) would designate certain land administered by BLM and the National Forest Service in Oregon as wilderness and national recreation areas, and would make additional wild and scenic river designations. 161 Cong. Rec. S4648 (daily ed. June 29, 2015). The bill was referred to the Committee on Energy and Natural Resources.

S. 1700 (Murkowski, R-Alaska) (water) would require the U.S. Army Corps of Engineers to establish a loan program to enable eligible public entities to purchase credits from mitigation banks or in-lieu fee programs, or to acquire interests in real property that is acquired pursuant to mitigation projects required under certain CWA

permits. 161 Cong. Rec. S4648 (daily ed. June 25, 2015). The bill was referred to the Committee on Environment and Public Works.

S. 1701 (Murkowski, R-Alaska) (water) would amend the CWA to modify a provision relating to discharges of dredged or fill material into navigable waters at specified disposal sites. 161 Cong. Rec. S4648 (daily ed. June 25, 2015). The bill was referred to the Committee on Environment and Public Works.

H.R. 2594 (MacArthur, R-N.J.) (natural resources) would amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act to ensure that the receipt of certain loans provided by the Small Business Administration does not violate the prohibition against receiving duplicative financial assistance in the case of a disaster. 161 Cong. Rec. H3641 (daily ed. June 1, 2015). The bill was referred to the Committee on Transportation and Infrastructure.

H.R. 2595 (Norton, D-D.C.) (land use) would establish a nationally significant federal lands and tribal projects program. 161 Cong. Rec. H3641 (daily ed. June 1, 2015). The bill was referred to the Committee on Transportation and Infrastructure.

H.R. 2599 (Rouzer, R-N.C.) (water) would prohibit the obligation of certain funds until EPA withdraws the rule relating to the definition of waters of the United States. 161 Cong. Rec. H3641 (daily ed. June 1, 2015). The bill was referred to the Committee on Energy and Commerce, Committee on Agriculture, Committee on Transportation and Infrastructure, and Committee on Science, Space, and Technology.

H.R. 2606 (Hartzler, R-Mo.) (land use) would discontinue funding for landscaping and scenic enhancement under the federal highway program. 161 Cong. Rec. H3756 (daily ed. June 2, 2015). The bill was referred to the Committee on Transportation and Infrastructure.

H.R. 2609 (Johnson, R-Tex.) (land use) would repeal the transportation alternatives program of the federal

highway program. 161 Cong. Rec. H3757 (daily ed. June 2, 2015). The bill was referred to the Committee on Transportation and Infrastructure.

H.R. 2616 (Quigley, D-Ill.) (natural resources) would direct FEMA to enter into an agreement with the National Academy of Sciences to conduct a study on urban flooding. 161 Cong. Rec. H3757 (daily ed. June 2, 2015). The bill was referred to the Committee on Transportation and Infrastructure, and Committee on Financial Services.

H.R. 2622 (Tonko, D-N.Y.) (waste) would direct the Department of Veterans Affairs to establish a registry of certain veterans who were stationed at Fort McClellan, Alabama. 161 Cong. Rec. H3757 (daily ed. June 2, 2015). The bill was referred to the Committee on Veterans' Affairs.

H.R. 2630 (Jolly, R-Fla.) (water) would extend the moratorium on oil and gas leasing and related activities in certain areas of the Gulf of Mexico. 161 Cong. Rec. S3877 (daily ed. June 3, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2636 (Kelly, D-Ill.) (toxic substances) would require a study on the public health and environmental impacts of the production, transportation, storage, and use of petroleum coke. 161 Cong. Rec. H3877 (daily ed. June 3, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2637 (Kelly, R-Pa.) (air) would amend the CAA to prohibit the regulation of emissions of carbon dioxide from new or existing power plants under certain circumstances. 161 Cong. Rec. H3877 (daily ed. June 3, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2644 (Zinke, R-Mont.) (natural resources) would expedite certain forest management activities on National Forest System lands when developed through a collaborative process of interested parties, require bonds to be posted when legal challenges to certain forest management activities are initiated, modify the Secure Rural Schools and Community Self-Determination Act, and authorize additional funding

sources for forest management activities. 161 Cong. Rec. H3878 (daily ed. June 3, 2015). The bill was referred to the Committee on Agriculture and Committee on Natural Resources.

H.R. 2647 (Westerman, R-Ark.) (natural resources) would expedite NEPA processes and improve forest management activities in units of the National Forest System derived from the public domain, on public lands under the jurisdiction of BLM, and on tribal lands to return resilience to fire-prone forest lands. 161 Cong. Rec. H3912 (daily ed. June 4, 2015). The bill was referred to the Committee on Agriculture and Committee on Natural Resources.

H.R. 2657 (Reed, R-N.Y.) (energy) would modify the energy tax credit to provide greater incentives for industrial energy efficiency. 161 Cong. Rec. H3913 (daily ed. June 4, 2015). The bill was referred to the Committee on Ways and Means.

H.R. 2661 (Fortenberry, R-Neb.) (land use) would amend the National Trails System Act to include national discovery trails and to designate the American Discovery Trail. 161 Cong. Rec. H3913 (daily ed. June 4, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2663 (Gosar, R-Ariz.) (land use) would promote the development of renewable energy on public land. 161 Cong. Rec. H3914 (daily ed. June 4, 2015). The bill was referred to the Committee on Agriculture and Committee on Natural Resources.

H.R. 2675 (Mullin, R-Okla.) (air) would direct EPA to allow low-volume motor vehicle manufacturers to install engines from vehicles that have been issued certificates of conformity. 161 Cong. Rec. H3914 (daily ed. June 4, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2687 (Swalwell, D-Cal.) (natural resources) would amend the National Materials and Minerals Policy Research and Development Act and authorize an energy-critical elements program. 161 Cong. Rec. H3921 (daily

ed. June 8, 2015). The bill was referred to the Committee on Science, Space, and Technology.

H.R. 2689 (Walters, R-Cal.) (water) would clarify the scope of eligible water resource projects under the Water Resources Development Act and the Water Resources Reform and Development Act. 161 Cong. Rec. H4001 (daily ed. June 9, 2015). The bill was referred to the Committee on Transportation and Infrastructure.

H.R. 2697 (Grijalva, D-Ariz.) (wild-life) would assist in the conservation of rare felids and canids by providing financial resources for the conservation programs of nations within the range of rare felid and canid populations and projects of persons with demonstrated expertise in the conservation of rare felids and canids. 161 Cong. Rec. H4001 (daily ed. June 9, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2705 (Thornberry, R-Tex.) (water) would clarify the definition of navigable waters. 161 Cong. Rec. H4001 (daily ed. June 9, 2015). The bill was referred to the Committee on Transportation and Infrastructure.

H.R. 2716 (DeSantis, R-Fla.) (land use) would grant states authority for most taxing and spending for highway and mass transit programs. 161 Cong. Rec. H4135 (daily ed. June 10, 2015). The bill was referred to the Committee on Transportation and Infrastructure, Committee on Ways and Means, Committee on Budget, and Committee on Rules.

H.R. 2717 (Farr, D-Cal.) (water) would modify the Federal Ocean Acidification Research and Monitoring Act. 161 Cong. Rec. H4135 (daily ed. June 10, 2015). The bill was referred to the Committee on Science, Space, and Technology.

H.R. 2719 (Kilmer, D-Wash.) (water) would amend the CZMA to authorize grants to Indian tribes for achievement of tribal coastal zone objectives. 161 Cong. Rec. H4135 (daily ed. June 10, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2724 (McKinley, R-W. Va.) (energy) would amend the Energy Policy Act to reauthorize hydroelectric production incentives and hydroelectric efficiency-improvement incentives. 161 Cong. Rec. H4136 (daily ed. June 10, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2735 (Conaway, R-Tex.) (wildlife) would amend the ESA to require the establishment of objective numerical recovery goals for the removal of species from lists of endangered and threatened species. 161 Cong. Rec. H4241 (daily ed. June 11, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2738 (Hastings, D-Fla.) (wildlife) would encourage and facilitate efforts by states and other transportation rights-of-way managers to adopt integrated vegetation-management practices, including the planting of native forbs and grasses that provide habitats and forage for monarch butterflies, native bees, and other native pollinators. 161 Cong. Rec. H4241 (daily ed. June 11, 2015). The bill was referred to the Committee on Transportation and Infrastructure.

H.R. 2743 (Young, R-Ark.) (water) would reauthorize the Hydrographic Services Improvement Act. 161 Cong. Rec. H4242 (daily ed. June 11, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2744 (Young, R-Ark.) (water) would reauthorize the Integrated Coastal and Ocean Observation System Act. 161 Cong. Rec. H4242 (daily ed. June 11, 2015). The bill was referred to the Committee on Natural Resources and Committee on Science, Space, and Technology.

H.R. 2746 (Bilirakis, R-Fla.) (natural resources) would provide a tax credit for hurricane and tornado mitigation expenditures. 161 Cong. Rec. H4342 (daily ed. June 12, 2015). The bill was referred to the Committee on Ways and Means.

H.R. 2749 (Valadao, R-Cal.) (governance) would amend the Reclamation Safety of Dams Act of 1978. 161 Cong. Rec. H4343 (daily ed. June 12, 2015).

The bill was referred to the Committee on Natural Resources.

H.R. 2763 (McNerney, D-Cal.) (energy) would support development of educational programs for careers in renewable energy. 161 Cong. Rec. H4343 (daily ed. June 12, 2015). The bill was referred to the Committee on Education and Workforce.

H.R. 2765 (Salmon, R-Ariz.) (climate change) would prohibit the National Science Foundation from obligating amounts for the Polar Learning and Responding Climate Change Educational Partnership. 161 Cong. Rec. H4343 (daily ed. June 12, 2015). The bill was referred to the Committee on Science, Space, and Technology.

H.R. 2768 (Blumenauer, D-Or.) (waste) would amend the Internal Revenue Code to provide for the use of funds in the Hazardous Substance Superfund for the purposes for which they were collected to ensure adequate resources for the cleanup of hazardous substances under CERCLA. 161 Cong. Rec. H4381 (daily ed. June 15, 2015). The bill was referred to the Committee on Ways and Means, Committee on Transportation and Infrastructure, Committee on Budget, and Committee on Energy and Commerce.

H.R. 2773 (Beatty, D-Ohio) (governance) would amend the Elementary and Secondary Education Act to provide grants to local educational agencies to encourage girls and underrepresented minorities to pursue studies and careers in science, mathematics, engineering, and technology. 161 Cong. Rec. H4381 (daily ed. June 15, 2015). The bill was referred to the Committee on Education and Workforce.

H.R. 2783 (Pallone, D-N.J.) (waste) would amend the Internal Revenue Code to extend financing of the Hazardous Substance Superfund. 161 Cong. Rec. H4382 (daily ed. June 15, 2015). The bill was referred to the Committee on Ways and Means.

H.R. 2787 (Zinke, R-Mont.) (land use) would designate certain segments of East Rosebud Creek in Carbon County, Montana, as components of

the Wild and Scenic Rivers System. 161 Cong. Rec. H4382 (daily ed. June 15, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2792 (Grothman, R-Wis.) (air) would require that any revision to, or establishment of, primary or secondary NAAQS be made by statute. 161 Cong. Rec. H4431 (daily ed. June 16, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2804 (Cartwright, D-Pa.) (climate change) would establish an integrated national approach to respond to ongoing and expected effects of extreme weather and climate change by protecting, managing, and conserving fish, wildlife, and plants, and to maximize government efficiency and reduce costs, in cooperation with state, local, and tribal governments. 161 Cong. Rec. H4491 (daily ed. June 17, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2809 (Dold, R-Ill.) (water) would amend the CWA to prohibit the dumping of sewage into the Great Lakes. 161 Cong. Rec. H2809 (daily ed. June 17, 2015). The bill was referred to the Committee on Transportation and Infrastructure.

H.R. 2816 (Simpson, R-Idaho) (water) would convey certain land in Blaine County, Idaho, to the city of Ketchum to be used to support recreation, educational, and public purposes, including river restoration, floodplain management, and municipal water storage. 161 Cong. Rec. H4491 (daily ed. June 17, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2840 (Salmon, R-Ariz.) (governance) would prohibit any appropriation of funds for EPA's science and technology account. 161 Cong. Rec. H2840 (daily ed. June 18, 2015). The bill was referred to the Committee on Science, Space, and Technology.

H.R. 2842 (DeSaulnier, D-Cal.) (energy) would provide whistleblower protections to certain workers in the offshore oil and gas industry. 161 Cong. Rec. H4541 (daily ed. June 18, 2015). The bill was referred to the Committee on Education and Workforce.

H.R. 2847 (Royce, R-Cal.) (governance) would encourage African countries to provide first-time access to electricity and power services for at least 50,000,000 people in sub-Saharan Africa by 2020. 161 Cong. Rec. H4591 (daily ed. June 23, 2015). The bill was referred to the Committee on Foreign Affairs.

H.R. 2849 (Doyle, D-Pa.) (land use) would amend the Animal Welfare Act to ensure that all dogs and cats used by research facilities are obtained legally. 161 Cong. Rec. H4591 (daily ed. June 23, 2015). The bill was referred to the Committee on Agriculture.

H.R. 2853 (Harper, R-Miss.) (water) would amend the SDWA to reauthorize technical assistance to small public water systems. 161 Cong. Rec. H4591 (daily ed. June 23, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2858 (McSally, R-Ariz.) (land use) would phase out animal testing for cosmetics, as well as the sale of cosmetics tested on animals. 161 Cong. Rec. H4591 (daily ed. June 23, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2864 (Sensenbrenner, R-Wis.) (energy) would prohibit EPA from extending the renewable fuel program past 2022 if the Agency waives applicable volume requirements in prior years. 161 Cong. Rec. H4592 (daily ed. June 23, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2876 (Graves, R-La.) (waste) would promote the recycling of vessels in the United States. 161 Cong. Rec. H4650 (daily ed. June 24, 2015). The bill was referred to the Committee on Armed Services and Committee on Veterans' Affairs.

H.R. 2883 (Poe, R-Tex.) (governance) would amend the Internal Revenue Code to extend the publicly traded partnership-ownership structure to energy power-generation projects and transportation fuels. 161 Cong. Rec. H4650 (daily ed. June 24, 2015). The

bill was referred to the Committee on Ways and Means.

H.R. 2898 (Valadao, R-Cal.) (natural resources) would provide drought relief in California. 161 Cong. Rec. H4769 (daily ed. June 25, 2015). The bill was referred to the Committee on Natural Resources and Committee on Agriculture.

H.R. 2900 (Reichert, R-Wash.) (land use) would establish the Mountains to Sound Greenway National Heritage Area in Washington. 161 Cong. Rec. H4769 (daily ed. June 25, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2901 (Ross, R-Fla.) (natural resources) would amend the Flood Disaster Protection Act to require that certain buildings and personal property be covered by flood insurance. 161 Cong. Rec. H4769 (daily ed. June 25, 2015). The bill was referred to the Committee on Financial Services.

H.R. 2908 (Clay, D-Mo.) (wildlife) would adopt the bison as the national mammal of the United States. 161 Cong. Rec. H4769 (daily ed. June 25, 2015). The bill was referred to the Committee on Oversight and Government Reform.

H.R. 2909 (Sinema, D-Ariz.) (natural resources) would establish an interagency working group to study the use of unmanned aircraft systems for wildland firefighting. 161 Cong. Rec. H4769 (daily ed. June 25, 2015). The bill was referred to the Committee on Natural Resources, Committee on Agriculture, and Committee on Transportation and Infrastructure.

H.R. 2910 (Gosar, R-Ariz.) (wildlife) would ensure that FWS' Mexican wolf nonessential experimental population rule has no force or effect. 161 Cong. Rec. H4769 (daily ed. June 25, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2918 (Curbelo, R-Fla.) (natural resources) would ensure fairness in premium rates for coverage under the National Flood Insurance Program for residences and business properties.

161 Cong. Rec. H4770 (daily ed. June 25, 2015). The bill was referred to the Committee on Financial Services.

H.R. 2923 (Green, D-Tex.) (governance) would require DOE to award grants to expand programs in maritime and energy-workforce technical training. 161 Cong. Rec. H4770 (daily ed. June 25, 2015). The bill was referred to the Committee on Education and Workforce and Committee on Transportation and Infrastructure.

H.R. 2924 (Grijalva, D-Ariz.) (natural resources) would withdraw certain federal lands and interests located in Pima and Santa Cruz counties, Arizona, from federal mining and mineral leasing laws. 161 Cong. Rec. H4770 (daily ed. June 25, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2925 (Grijalva, D-Ariz.) (land use) would establish the Santa Cruz Valley National Heritage Area. 161 Cong. Rec. H4770 (daily ed. June 25, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2926 (Grijalva, D-Ariz.) (land use) would designate certain public lands in the Sonoran Desert of Arizona as national conservation areas and wilderness areas. 161 Cong. Rec. H4770 (daily ed. June 25, 2015). The bill was referred to the Committee on Natural Resources.

H.R. 2929 (Hurt, R-Va.) (energy) would amend the Federal Power Act to require FERC to minimize infringement on the exercise and enjoyment of property rights in issuing hydropower licenses. 161 Cong. Rec. H4770 (daily ed. June 25, 2015). The bill was referred to the Committee on Energy and Commerce.

H.R. 2930 (Israel, D-N.Y.) (water) would amend and reauthorize certain provisions relating to Long Island Sound restoration and stewardship. 161 Cong. Rec. H4770 (daily ed. June 25, 2015). The bill was referred to the Committee on Natural Resources and Committee on Transportation and Infrastructure.

In the Courts

These entries summarize recent cases under the following categories: Air, Governance, Land Use, Natural Resources, Waste, Water, and Wildlife. The entries are arranged alphabetically by case name within each category. This material is updated monthly. For archived materials, visit <http://www.elr.info/judicial>.

AIR

Association of Irrigated Residents v. U.S. Environmental Protection Agency, No. 13-73398, 45 ELR 20118 (9th Cir. June 23, 2015). The Ninth Circuit denied petitions for review challenging EPA's promulgation of 40 C.F.R. §52.245, a regulation that revised the scope of a previous EPA decision, after the Agency determined that it had mistakenly approved certain new source review rules in 2004 as part of California's SIP.

Hermes Consolidated, LLC v. Environmental Protection Agency, No. 14-1016, 45 ELR 20102 (D.C. Cir. June 2, 2015). The D.C. Circuit vacated and remanded an EPA decision denying an oil refinery's request to extend its exemption from the Agency's renewable fuels program.

Medical Advocates for Healthy Air v. U.S. Environmental Protection Agency, No. 12-73386, 45 ELR 20123 (9th Cir. June 18, 2015). The Ninth Circuit denied a petition for review challenging EPA's approval of a revision to California's SIP that authorized the San Joaquin Valley air pollution control district to impose fees on mobile sources of pollution—primarily motor vehicles—as an alternative to the fees previously imposed on stationary sources of pollution under CAA §185.

Mississippi Commission on Environmental Quality v. Environmental Protection Agency, No. 12-1309, 45 ELR 20104 (D.C. Cir. June 2, 2015). The D.C. Circuit denied petitions for review of EPA decisions regarding nonattainment designations under the 2008 ozone NAAQS.

In re Murray Energy Corp., Nos. 14-1116 et al., 45 ELR 20110 (D.C. Cir. June 9, 2015). The D.C. Circuit dismissed petitions for review challeng-

ing EPA's anticipated rule restricting carbon dioxide emissions from existing power plants.

National Parks Conservation Ass'n v. U.S. Environmental Protection Agency, Nos. 12-73710, -73757, 45 ELR 20111 (9th Cir. June 9, 2015). The Ninth Circuit granted in part and denied in part petitions for review challenging EPA's federal implementation plan to reduce regional haze at two power plants in Montana.

Westar Energy, Inc. v. Environmental Protection Agency, No. 11-1333, 45 ELR 20100 (D.C. Cir. May 26, 2015). The D.C. Circuit denied petitions for review challenging EPA's disapproval of a revision to Kansas' proposed SIP revision for the 2006 fine particulate matter NAAQS.

GOVERNANCE

Adkisson v. Jacobs Engineering Group, Inc., No. 14-6207, 45 ELR 20109 (6th Cir. June 2, 2015). The Sixth Circuit reversed and remanded a lower court decision dismissing individuals' lawsuit against a government contractor on jurisdictional grounds, holding that the company was not necessarily immune from suit.

Horne v. Department of Agriculture, No. 14-275, 45 ELR 20120 (U.S. June 22, 2015). The U.S. Supreme Court held that a USDA marketing order under the Agricultural Marketing Agreement Act of 1937 requiring raisin producers to participate in a raisin reserve program violates the Fifth Amendment's prohibition against taking property without just compensation.

Partnership v. Environmental Protection Agency, No. 3:14-cv-0171-HRH, 45 ELR 20108 (D. Alaska June 4, 2015). A district court dismissed portions of a

mining company's lawsuit against EPA alleging that the Agency violated the Federal Advisory Committee Act during its review of the proposed Pebble Mine in Alaska.

LAND USE

Openlands v. United States Department of Transportation, No. 13 C 4950, 45 ELR 20119 (N.D. Ill. June 16, 2015). A district court held that the Federal Highway Administration's record of decision and EIS for a proposed tollroad project between Indiana and Illinois violated NEPA.

WildEarth Guardians v. Montana Snowmobile Ass'n, No. 12-35434, 45 ELR 20117 (9th Cir. June 22, 2015). The Ninth Circuit held that the U.S. Forest Service violated NEPA and other environmental safeguards when it designated over 2 million acres of public land within the Beaverhead-Deerlodge National Forest for use by snowmobiles and other winter motorized vehicles.

NATURAL RESOURCES

Alaska Conservation Foundation v. Pebble Ltd. Partnership, No. 7012, 45 ELR 20105 (Alaska May 29, 2015). The Supreme Court of Alaska reversed a lower court decision that plaintiffs challenging land and water use permits allowing intensive mineral exploration in Alaska's prospective Pebble Mine had "sufficient economic incentive" to warrant the imposition of attorneys fees against them.

Aulukestai v. Alaska, No. 7011, 45 ELR 20106 (Alaska May 29, 2015). The Supreme Court of Alaska held that the state's Department of Natural Resources should have provided public notice before issuing land and water use permits allowing intensive

mineral exploration in the prospective Pebble Mine.

Swanson Group Mfg., LLC v. Jewell, No. 13-5268, 45 ELR 20113 (D.C. Cir. June 12, 2015). The D.C. Circuit reversed a lower court injunction requiring BLM to sell more timber from federal land managed under the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act of 1937.

WASTE

Carbon Sequestration Council v. Environmental Protection Agency, No. 14-1046, 45 ELR 20103 (D.C. Cir. June 2, 2015). The D.C. Circuit held that energy companies lack standing to challenge EPA's determination that carbon dioxide streams injected into Class VI wells for the purpose of geologic sequestration constitute "solid waste" subject to RCRA. Class VI wells are designated to receive CO₂ streams generated as part of a climate change mitigation program known as carbon capture and storage.

Solvay USA Inc. v. Environmental Protection Agency, No. 11-1189, 45 ELR 20107 (D.C. Cir. June 3, 2015). The D.C. Circuit denied several petitions for review challenging aspects of an EPA rule that provides procedures for classifying non-hazardous secondary materials as RCRA "solid waste" for the purpose of CAA emission standards for incinerators and other combustion units.

WATER

Alaska Wilderness League v. Jewell, No. 13-35866, 45 ELR 20112 (9th Cir. June 11, 2015). The Ninth Circuit upheld the Bureau of Safety and Environmental Enforcement's approval of oil spill response plans for an oil company's leases in the Beaufort and Chukchi Seas on Alaska's Arctic coast.

McClung v. Paul, No. 14-3463, 45 ELR 20115 (8th Cir. June 8, 2015). The Eighth Circuit held that the U.S. Army Corps of Engineers did not abuse its discretion when it revoked homeowners' permits to maintain a boat dock and stone steps on the public land between their property and a lake.

Ohio Valley Environmental Coalition v. McCarthy, No. 3:15-0277, 45 ELR 20122 (S.D. W. Va. June 19, 2015). A district court dismissed environmental groups' CWA citizen suit against EPA for failing to respond in writing to their administrative petition seeking withdrawal of West Virginia's NPDES permit program, but held that the groups may go forward with their claim that the Agency's failure to timely respond to their petition constitutes "agency action unlawfully withheld or unreasonably delayed" in violation of the APA.

Sierra Club v. Bostick, No. 14-6099, 45 ELR 20101 (10th Cir. May 29, 2015). The Tenth Circuit held the U.S. Army Corps of Engineers did not violate NEPA, the CWA, or nationwide permit 12 when it allowed an energy com-

pany to build a 485-mile oil pipeline from Oklahoma to Texas under the general permit.

Turner v. Georgia River Network, No. S14G1780, 45 ELR 20116 (Ga. Sup. Ct. June 15, 2015). Georgia's highest court held that the state's 25-foot buffer zone for development projects along state waters does not apply to wetlands.

WILDLIFE

Bear Valley Mutual Water Co. v. Jewell, No. 12-57297, 45 ELR 20121 (9th Cir. June 25, 2015). The Ninth Circuit upheld a 2010 FWS rule designating critical habitat for the threatened Santa Ana sucker, a small freshwater fish native to several California rivers and streams.

Cottonwood Environmental Law Center v. United States Forest Service, Nos. 13-35624, -35631, 45 ELR 20114 (9th Cir. June 17, 2015). The Ninth Circuit held that the U.S. Forest Service violated ESA §7 when it failed to reinitiate consultation after FWS designated critical habitat for the Canada lynx on National Forest land.

National Ass'n of Home Builders v. United States Fish & Wildlife Service, No. 14-5121, 45 ELR 20099 (D.C. Cir. May 26, 2016). The D.C. Circuit held that building and development associations lacked standing to challenge consent decrees that require FWS to determine, in accordance with a settlement-defined schedule, whether 251 species should be listed as endangered or threatened under the ESA.

In the Federal Agencies

These entries cover the period June 1, 2015, through June 30, 2015. Citations are to the *Federal Register* (FR). Entries below are organized by Final Rules, Proposed Rules, and Notices. Within each section, entries are further subdivided by the subject matter area, with entries listed chronologically. This material is updated monthly. For archived material, visit <http://elr.info/daily-update/archives>.

Final Rules

AIR

EPA determined that the Agency has satisfied its CAA §112(c)(6) requirement to establish emission standards for source categories subject to CAA §§112(d)(2) or 112(d)(4). 80 FR 31470 (6/3/15).

EPA, in response to a petition for rule-making filed by the Sierra Club, issued SIP calls for 36 states to comply with excess emission requirements during periods of startup, shutdown, or malfunction and established a due date for the states to submit corrective SIP revisions. 80 FR 33839 (6/12/14).

EPA revised the NESHAPs for the ferroalloys production source category, including particulate matter standards, opacity limits and monitoring, and emissions standards for four previously unregulated hazardous air pollutants; the revisions, based on the Agency's residual risk and technology review, are intended to achieve significant reductions of process fugitive emissions, especially manganese. 80 FR 37365 (6/30/15).

SIP Approvals: California (volatile organic compounds from polyester resin operations and oil-water separators in the Eastern Kern air pollution control district and the Mojave Desert air quality management district) 80 FR 32026 (6/5/15); (emission statements, definitions, and vehicle and mobile equipment coating operations for the Butte County and Feather River air quality management districts and for the San Luis Obispo County air pollution control district) 80 FR 33195 (6/11/15). Connecticut (consistency with federal NAAQS) 80 FR 36242 (6/24/15). Iowa

(best management practices for grain vacuuming operations at Group 1 grain elevators and related revisions) 80 FR 33192 (6/11/15). Kansas (infrastructure requirements for the 2010 sulfur dioxide NAAQS) 80 FR 32017 (6/5/15). Maryland (attainment of the 2008 eight-hour ozone NAAQS in the Baltimore moderate nonattainment area for the 2012-2014 monitoring period) 80 FR 30941 (6/1/15); (new regulation for biomass fuel-burning equipment and related amendments to existing regulations) 80 FR 32472 (6/9/15). Michigan (revisions to Part 3 Rules on particulate matter emission limitations and prohibitions for open burning and electro-static precipitators) 80 FR 31305 (6/2/15). Missouri (plantwide applicability limitations for greenhouse gases under the construction permits rule) 80 FR 31844 (6/4/15). New Mexico (infrastructure requirements for the 2008 lead NAAQS and removal of repealed statewide cement kilns rule) 80 FR 33191 (6/11/15); (update of transportation conformity rules and removal of general conformity provisions) 80 FR 34835 (6/18/15); (2008 NAAQS for ozone, 2010 NAAQS for nitrogen dioxide, and attainment of the 2006 fine particulate matter NAAQS for the interstate transport of air pollution and visibility protection) 80 FR 36246 (6/24/15). New York (certain infrastructure requirements for the 2008 lead NAAQS) 80 FR 30939 (6/1/15); (attainment demonstration for the New York County portion of the NY-NJ-CT carbon monoxide attainment area) 80 FR 33418 (6/12/14). North Dakota (alternative opacity monitoring plan for a coal-fired electric-generating unit) 80 FR 37157 (6/30/15). Ohio (fine particulate matter new source review) 80 FR 36477 (6/25/15). Pennsylvania (2011 base-year emissions inventory revision for the 2008 lead NAAQS in the Lyons nonattainment area) 80 FR 32474 (6/9/15); (updates to motor

vehicle emissions budgets for nitrogen oxides for the 1997 eight-hour ozone NAAQS in the Scranton/Wilkes-Barre maintenance area, general conformity budgets for the construction of a power plant, and point and area source inventories for nitrogen oxides) 80 FR 34063 (6/15/15); (installation permit application and administration fees and open burning permit application fees for Allegheny County) 80 FR 36239 (6/24/15); (volatile organic compound emissions from offset lithographic printing and letterpress printing, flexible package printing, and adhesives, sealants, primers, and solvents) 80 FR 36481 (6/25/15). Rhode Island (decommissioning of Stage II vapor recovery systems and strengthening of requirements for Stage I vapor recovery systems at gasoline dispensing facilities) 80 FR 32469 (6/9/15). South Carolina (emissions statements and base-year emissions inventory for the South Carolina portion of the bi-state Charlotte 2008 eight-hour ozone NAAQS nonattainment area) 80 FR 33413 (6/12/14). West Virginia (five-year progress report for regional haze) 80 FR 32019 (6/5/15); (PSD preconstruction permitting requirements for major sources of fine particulate matter) 80 FR 36483 (6/25/15).

SIP Disapproval: Illinois (infrastructure submission for the 2006 fine particulate matter and 2008 ozone NAAQS) 80 FR 33458 (6/12/14).

SIP Withdrawal: Texas (volatile organic compound emissions from degassing of storage tanks, transport vessels, and marine vessels) 80 FR 37161 (6/30/15).

CLIMATE CHANGE

CEQ issued instructions to federal agencies to incorporate sustainability practices into agency policies and

practices, as required under Executive Order No. 13693, "Planning for Federal Sustainability in the Next Decade," which was signed by the president on March 19, 2015, to reduce greenhouse gas emissions by at least 40% over the next decade. 80 FR 34149 (6/15/15).

GOVERNANCE

The federal agencies issued their semi-annual regulatory agendas to update the public about regulations and major policies currently under development, reviews of existing regulations and major policies, and rules and major policymakings completed or canceled since the last agenda. EPA's agenda can be found at 80 FR 35081 (6/18/15).

LAND USE

USDA's Rural Business-Cooperative Service issued an interim final rule for the Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program that establishes provisions for the loan guarantees available for biorefineries to support the production of advanced biofuels and renewable chemicals and for biobased product manufacturing facilities pursuant to the 2014 Farm Bill. 80 FR 36409 (6/24/15).

TOXIC SUBSTANCES

EPA promulgated significant new use rules under TSCA for 22 chemical substances that were the subject of premanufacture notices. 80 FR 32003 (6/5/15).

WATER

USDA's Natural Resources Conservation Service amended the Water Bank Program regulations to clarify that lands owned by Indian Tribes are eligible for enrollment. 80 FR 32439 (6/9/15).

EPA Regions 1, 2, 3, 5, 6, 7, 8, 9, and 10 issued their final five-year NPDES general permit for stormwater discharges from industrial activity, also referred to as the Multi-Sector General Permit, for 2015. 80 FR 34403 (6/16/15).

EPA and the U.S. Army Corps of Engineers promulgated final rulemaking defining the scope of "waters of the United States" in light of the CWA, science, and the U.S. Supreme Court decisions in *United States v. Riverside Bayview Homes*, *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, and *Rapanos v. United States*. 80 FR 37053 (6/29/15).

WILDLIFE

FWS determined endangered species status for all chimpanzees under the ESA, eliminating the separate classification of captive and wild chimpanzees. 80 FR 34499 (6/16/15).

FWS determined that the eastern puma, whose last confirmed sighting was documented in 1938, is now extinct, and the agency removed the subspecies from the federal list of endangered and threatened wildlife under the ESA. 80 FR 34595 (6/17/15).

FWS designated approximately 5,214 acres in the Spring Mountains of Clark County, Nevada, as critical habitat for the Mount Charleston blue butterfly under the ESA. 80 FR 37403 (6/30/15).

Proposed Rules

AIR

EPA proposed annual percentage standards for cellulosic biofuel, biomass-based diesel, advanced biofuel, and total renewable fuel for all motor vehicle gasoline and diesel produced or imported in the years 2014, 2015, and 2016. 80 FR 33099 (6/10/15).

EPA proposed uses for the critical use exemption and the amount of methyl bromide that may be produced or imported for the 2016 control period under the authority of the Montreal Protocol on Substances That Deplete the Ozone Layer. 80 FR 33460 (6/12/14).

SIP Proposals: California (volatile organic compounds from polyester resin operations and oil-water separators in

the Eastern Kern air pollution control district and the Mojave Desert air quality management district) 80 FR 32078 (6/5/15); (emission statements, definitions, and vehicle and mobile equipment coating operations for the Butte County and Feather River air quality management districts and for the San Luis Obispo County air pollution control district) 80 FR 33223 (6/11/15). Colorado (infrastructure requirements for the 2008 ozone, 2008 lead, and 2010 nitrogen dioxide NAAQS) 80 FR 30974 (6/1/15). Connecticut (consistency with federal NAAQS) 80 FR 36306 (6/24/15). Georgia (removing the Gasoline Marketing Rule and Consumer and Commercial Products Rule, revising the NO_x Emissions From Stationary Gas Turbines and Stationary Engines Rule, and adding measures to offset emissions increases expected from these changes) 80 FR 36750 (6/26/15). Iowa (best management practices for grain vacuuming operations at Group 1 grain elevators and related revisions) 80 FR 33222 (6/11/15). Kansas (regional haze plan and 2014 five-year progress report) 80 FR 32874 (6/10/15). Michigan (revisions to Part 3 Rules on particulate matter emission limitations and prohibitions for open burning and electro-static precipitators) 80 FR 31338 (6/2/15); (infrastructure requirements for the 2008 ozone, 2010 nitrogen dioxide, 2010 sulfur dioxide, and 2012 fine particulate matter NAAQS) 80 FR 36306 (6/24/15). Minnesota (infrastructure requirements for the 2008 ozone, 2010 nitrogen dioxide, 2010 sulfur dioxide, and 2012 fine particulate matter NAAQS. 80 FR 36743 (6/26/15). Missouri (full approval of attainment for the 2008 lead NAAQS in portions of Dent, Iron, and Reynolds counties and restriction of lead emissions from specific sources) 80 FR 30965 (6/1/15). Nebraska (partial approval of infrastructure submission for the 2008 NAAQS for ozone) 80 FR 35284 (6/19/15). New Mexico (infrastructure submission for the 2010 sulfur dioxide NAAQS) 80 FR 36956 (6/29/15). North Dakota (alternative opacity monitoring plan for a coal-fired electric-generating unit) 80 FR 37205 (6/30/15). Ohio (fine particulate matter new source review) 80 FR 36498 (6/25/15). Pennsylvania (2011 base-year emissions inventory revision for the

2008 lead NAAQS in the Lyons nonattainment area) 80 FR 32522 (6/9/15). Rhode Island (low-emission standards for certain 2008 and 2009 light-duty and medium-duty motor vehicles to reduce volatile organic compounds, nitrogen oxides, and greenhouse gases) 80 FR 31867 (6/4/15). South Carolina (infrastructure requirements for the 2008 lead NAAQS) 80 FR 32324 (6/8/15); (emissions statements and base-year emissions inventory for the South Carolina portion of the bi-state Charlotte 2008 eight-hour ozone NAAQS nonattainment area) 80 FR 33460 (6/12/14). Utah (update and revision of rules, general requirements, and test methods) 80 FR 35295 (6/19/15). Virginia (addition of plantwide applicability limit provisions for greenhouse gases to PSD program) 80 FR 32078 (6/5/15). Washington (interstate transport requirements for the 2006 24-hour fine particulate matter NAAQS) 80 FR 32870 (6/10/15).

TOXIC SUBSTANCES

EPA proposed to approve revisions to Utah's lead-based paint renovation, repair, and painting program under TSCA §402(c)(3). 80 FR 31871 (6/4/15).

EPA proposed significant new use rules under TSCA for 30 chemical substances that were the subject of premanufacture notices. 80 FR 32879 (6/10/15).

WASTE

EPA proposed to approve revisions to Idaho's hazardous waste management program under RCRA. 80 FR 31338 (6/2/15).

WILDLIFE

FWS, in conjunction with its 12-month finding on a petition to delist, proposed to remove the Hualapai Mexican vole from the list of endangered and threatened wildlife under the ESA because the currently listed subspecies is not a valid taxonomic entity. 80 FR 31875 (6/4/15).

Notices

AIR

EPA announced the availability of preliminary calculations of emission allowance allocations for the 2015 compliance year to certain units in various states under the Cross-State Air Pollution Rule. 80 FR 30988 (6/1/15).

EPA entered into a proposed consent decree under the CAA in *Environmental Integrity Project v. McCarthy*, No. 1:14-cv-2106 (D.D.C.), that would require the Agency to grant or deny by August 21, 2015, two petitions requesting that EPA object to two CAA Title V permits issued by the Texas Commission on Environmental Quality authorizing the operation of the Deer Park Chemical Plant and the Deer Park Refinery in Harris County, Texas. 80 FR 35951 (6/23/15).

EPA entered into a proposed consent decree under the CAA in *Center for Biological Diversity v. McCarthy*, No. 15-cv-00268 (D.D.C.), that establishes deadlines for EPA to take certain specified actions related to the 2006 fine particulate matter NAAQS for Iowa, Puerto Rico, and Washington. 80 FR 36335 (6/24/15).

NATURAL RESOURCES

OSM seeks public comment on a proposed amendment to Kentucky's regulatory program under SMCRA concerning permit application requirements. 80 FR 33456 (6/12/14).

The U.S. Army Corps of Engineers announced the formal termination of the NEPA Emergency Alternative Arrangements for the New Orleans Hurricane and Storm Damage Risk Reduction System implemented by agreement with CEQ following Hurricane Katrina. 80 FR 36776 (6/26/15).

TOXIC SUBSTANCES

EPA announced and seeks comment on its plan to incorporate an alternative

scientific approach to screen chemicals for their ability to interact with the endocrine system, using high throughput assays and a computational model to test pesticides and other substances that cause adverse effects. 80 FR 35350 (6/19/15).

WATER

EPA proposed to approve revisions to Arkansas' public water system supervision program, which adopted the Revised Total Coliform Rule by reference. 80 FR 32950 (6/10/15).

EPA announced final updated CWA §304(a) ambient water quality criteria recommended for the protection of human health for 94 chemical pollutants. 80 FR 36986 (6/29/15).

WILDLIFE

FWS announced a 90-day finding on a petition to remove the Bone Cave harvestman, a rare species of spider, from the list of endangered and threatened wildlife under the ESA; the agency found that delisting is not warranted. 80 FR 30990 (6/1/15).

FWS announced its 12-month finding on a petition to list Leona's little blue butterfly as an endangered or threatened species under the ESA and determined that listing is not warranted at this time. 80 FR 35916 (6/23/15).

DOJ NOTICES OF SETTLEMENT

United States v. Westchester, County of, No. 13 Civ. 5475 (NSR) (S.D.N.Y. May 21, 2015). A settling SDWA defendant that violated the Enhanced Water Treatment Rule by failing to prevent cryptosporidium contamination must pay a \$1,108,771 civil penalty, must perform three supplemental environmental projects valued at \$691,229 for the benefit of affected residents, and must perform both interim and permanent injunctive relief to comply with the rule. 80 FR 31073 (6/1/15).

United States v. F&R Contractors Corp., No. 3:15-cv-01666 (D.P.R. May 27,

2015). Settling CWA defendants that discharged stormwater pollutants to waters of the United States at three construction sites in Puerto Rico without an NPDES permit and that failed to implement the conditions of a federal construction general permit must pay a \$500,000 civil penalty and must implement comprehensive injunctive relief to ensure compliance with the CWA and applicable permit requirements. 80 FR 31922 (6/4/15).

United States v. Garden Homes, No. 2:15-cv-03618-CCC-JBC (D.N.J. May 29, 2015). Settling CWA defendants responsible for violations at 10 construction sites in New Jersey must pay a \$225,000 civil penalty, must perform a supplemental environmental project valued at approximately \$780,000, and must implement a companywide stormwater management program to provide increased oversight and to ensure greater compliance with the CWA. 80 FR 32412 (6/8/15).

United States v. District of Columbia Water & Sewer Authority, No. 1:00-cv-00183 (TFH) (D.C. May 19, 2015). Under a proposed first amendment to a consent decree, green infrastructure will be incorporated into the Potomac River and Rock Creek sewersheds, the size of the tunnel in the Potomac River will be reduced, and a tunnel dewatering pumping station and an enhanced clarification facility will be constructed at the Blue Plains wastewater treatment plant by 2030. 80 FR 32609 (6/9/15).

In re FBI Wind Down, Inc., No. 13-12329 (CSS) (Bankr. Ct. Del. June 3, 2015). A settling CERCLA liquidating trustee responsible for violations at the Buckingham County Landfill Superfund site in Dillwyn, Virginia, must provide the United States with an allowed and fixed general unsecured claim in the amount of \$6,000,000 for past and future U.S. response costs at the site. 80 FR 32978 (6/10/15).

United States v. Lynn Gammill, No. 1:12cv134 HSO-RHW (S.D. Miss. June 4, 2015). A settling CERCLA defendant must pay \$1,723,722 plus

interest in unreimbursed U.S. response costs incurred at the Picayune Wood Treating Superfund site in Picayune, Mississippi. 80 FR 33289 (6/11/15).

United States v. Enbridge Energy Ltd. Partnership, No. 1:15-CV-590 (W.D. Mich. June 8, 2015). Settling OPA defendants that own and operate a pipeline that ruptured and discharged oil into Talmadge Creek, the Kalamazoo River, and adjoining shorelines in Michigan must pay \$1,484,952, plus interest, in past natural resource damage assessment costs incurred by federal trustees; must pay \$150,000, plus interest, to two Indian Tribes; must complete a number of natural resource damage restoration projects in accordance with established or approved workplans and schedules; and must pay \$2,265,048, plus interest, to a Restoration Account to fund additional natural resource restoration projects and activities. 80 FR 33556 (6/12/14).

United States v. Clearwater Paper Corp., No. 15-00200 (D. Idaho June 9, 2015). A settling CAA defendant responsible for violations of new source performance standards, NESHAPs, and a Title V permit at its paper and pulp mill in Lewiston, Idaho, must pay a \$300,000 civil penalty and must install the necessary equipment to cease ongoing violations by September 30, 2015. 80 FR 34458 (6/16/15).

United States v. Texas Instruments Tucson Corp., No. 89-594-TUC-RMB (D. Ariz. June 16, 2015). A settling CERCLA defendant that is already working under an existing consent decree to address contaminated groundwater on part of the Tucson International Airport Authority Superfund site must implement an amended record of decision, must pay the United States its response costs, and must pay Arizona its state future response costs; the proposed decree would supersede the prior decree and add Arizona as a party. 80 FR 35675 (6/22/15).

United States v. Blymyer, No. 2:13-cv-01555 (W.D. Wash. June 10, 2015).

A settling CWA defendant that discharged pollutants into U.S. waters without a permit must restore the impacted areas, must perform mitigation, and must pay a civil penalty. 80 FR 36355 (6/24/15).

In re Mississippi Phosphates Corp., No. 14-51667-KMS (Bankr. S.D. Miss. June 22, 2015). Settling CAA, CERCLA, CWA, and RCRA debtors responsible for violations at their fertilizer manufacturing facility in Pascagoula, Mississippi, must either sell all or most of their assets to allow assumption of liabilities by EPA and Mississippi or transfer the assets to two trusts for sale and distribution of proceeds for lender claims and funding of environmental actions. 80 FR 37016 (6/29/15).

United States v. Arizona Public Service Co., No. 1:15-cv-00537 (D.N.M. June 24, 2015). Settling CAA defendants responsible for violations of PSD provisions and various implementing regulations at the Four Corners Power Plant near Shiprock, New Mexico, must pay a \$1,500,000 civil penalty, must reduce harmful sulfur dioxide, nitrogen oxide, and particulate matter emissions through the installation and operation of pollution controls, and must spend \$6,700,000 to fund environmental mitigation projects in communities adversely affected by the pollution. 80 FR 37302 (6/30/15).

United States v. Alabama Power Co., No. 2:01-cv-00152-VEH (N.D. Ala. June 25, 2015). Under a proposed joint stipulation to modify a 2006 consent decree, a settling CAA defendant responsible for violations of PSD provisions and implementing regulations at coal-fired electric-generating stations in Alabama must pay a \$100,000 civil penalty, must achieve reductions of sulfur dioxide and nitrogen oxides through the operation of emissions controls and unit retirements and conversions to natural gas, and must pay \$1,500,000 to fund environmental mitigation projects to further reduce emissions and benefit communities in Alabama. 80 FR 37303 (6/30/15).

In the State Agencies

The entries below cover state regulatory developments during the month of June 2015. The entries are arranged by state, and within each section, entries are further subdivided by subject matter. For material previously reported, visit <http://elr.info/administrative/state-updates/archive>.

CALIFORNIA

ENERGY

The Energy Commission is proposing to amend CAL. CODE REGS. tit 20, §3103, regarding the alternative and renewable fuel and vehicle technology program. Changes would eliminate an emission credits discounting requirement and clarify funding restrictions. A public hearing will be held August 12, 2015. *See* <http://www.oal.ca.gov/res/docs/pdf/notice/24z-2015.pdf> (pp. 947-52).

GOVERNANCE

The Water Resources Board is proposing to amend its conflict-of-interest code. Changes would address departmental reorganization and make technical corrections. The deadline for comment is August 3, 2015. *See* <http://www.oal.ca.gov/res/docs/pdf/notice/25z-2015.pdf> (p. 1005).

LAND USE

The Department of Parks and Recreation is proposing to amend CAL. CODE REGS. tit. 14, §§4970.00 through 4970.26, regarding the off-highway motor vehicle recreation grant program. Among other changes, the amendments would clarify program requirements, incorporate information about the department's audit program, and require environmental analyses for activities proposed with matching funds for federal and nonfederal applicants. A public hearing will be held August 4, 2015, and the deadline for written comment is August 3, 2015. *See* <http://www.oal.ca.gov/res/docs/pdf/notice/25z-2015.pdf> (pp. 989-93).

WILDLIFE

The Fish and Game Commission is proposing to amend CAL. CODE REGS. tit. 14, §§478, 479, and 702, regarding implementation of the state's Bobcat Protection Act. Changes would either partially or totally prohibit bobcat trapping in the state. A public hearing will be held August 5, 2015. *See* <http://www.oal.ca.gov/res/docs/pdf/notice/22z-2015.pdf> (pp. 876-78).

COLORADO

AIR

The Department of Public Health and Environment is proposing to amend 5 COLO. CODE REGS. §1001-10, regarding NESHAP rules. The changes would incorporate updated EPA regulations by reference. A public hearing will be held on August 20, 2015, and the deadline for written comment is August 4, 2015. *See* <http://www.sos.state.co.us/CCR/RegisterPdfContents.do?publicationDay=06/10/2015> (pp. 355-74).

ENERGY

The Public Utilities Commission is proposing to amend 4 COLO. CODE REGS. §723-3 regarding certificates of public convenience and necessity. Changes would clarify that when evaluating requests for certificates, the commission will evaluate factors that affect employment and the long-term economic viability of communities in the state. A public hearing will be held August 13, 2015. *See* <http://www.sos.state.co.us/CCR/RegisterPdfContents.do?publicationDay=05/25/2015> (pp. 125-45).

LOUISIANA

AIR

The Department of Environmental Quality is proposing to amend LA. ADMIN. CODE tit. 33, §504.F, regarding ozone precursor regulation. Changes would allow emission increases of either nitrogen oxides or volatile organic compounds to be offset with decreases of the other. A public hearing was held July 29, 2015, and the deadline for comment is August 5, 2015. *See* <http://www.doa.louisiana.gov/osr/reg/1506/1506.pdf> (pp. 1130-32).

The Department of Environmental Quality is proposing to amend LA. ADMIN. CODE tit. 33, §603, regarding ozone emission reductions. Changes would allow owners or operators of stationary sources located in certain attainment areas to apply for emission reduction credits. A public hearing was held July 29, 2015, and the deadline for comment is August 5, 2015. *See* <http://www.doa.louisiana.gov/osr/reg/1506/1506.pdf> (pp. 1132-33).

WATER

The Department of Environmental Quality is proposing to amend LA. ADMIN. CODE tit. 33, §1123, regarding water quality standards. Changes would revise dissolved oxygen criteria for inland waters in the eastern Lower Mississippi River Alluvial Plains Ecoregion to reflect natural conditions that keep some waters from reaching the criteria. A public hearing was held July 29, 2015, and the deadline for comment is August 5, 2015. *See* <http://www.doa.louisiana.gov/osr/reg/1506/1506.pdf> (pp. 1125-30).

MISSOURI

AIR

The Department of Natural Resources is proposing to amend various portions of Mo. CODE REGS. ANN. tit. 10 §10-6 regarding the cross-state air pollution rule. The amendments would change the method of reallocating nitrogen oxide emission allowances for use with EPA's annual regional emission reduction program. A public hearing will be held August 3, 2015, and the deadline for comment is August 10, 2015. See <http://www.sos.mo.gov/adrules/moreg/current/v40n12/v40n12.pdf> (pp. 753-64).

NEW HAMPSHIRE

WATER

The Department of Environmental Services is proposing to readopt and amend N.H. CODE R. Env-Wt 501 and 800 regarding wetland mitigation. Changes would clarify existing requirements, improve the process for submitting and evaluating wetland mitigation proposals, and align the rules with revised federal requirements. A public hearing was held July 30, 2015, and the

deadline for comment is August 14, 2015. See <http://www.gencourt.state.nh.us/rules/register/2015/June-18-15.pdf> (pp. 1-6).

NEW YORK

WASTE

The Department of Environmental Conservation is proposing to amend N.Y. COMP. CODE R. & REGS. tit. 6, §§621 and 750, regarding the state right-to-know act. Changes would implement the reporting, notification, and recordkeeping requirements of sewage provisions of that act. The deadline for comment is August 3, 2015. See <http://docs.dos.ny.gov/info/register/2015/june17/pdf/rulemaking.pdf> (pp. 10-15).

The Department of Environmental Conservation is proposing to amend N.Y. COMP. CODE R. & REGS. tit. 6, §375, regarding the state's brownfield program. Changes would update regulations to reflect legislative limitations on brownfield development projects eligible for state tax credits. A public hearing was held July 29, 2015, and the deadline for comment is August 3, 2015. See <http://docs.dos.ny.gov/info/register/2015/june10/pdf/rulemaking.pdf> (pp. 7-9).

NORTH CAROLINA

AIR

The Department of Environment and Natural Resources is proposing to amend 15A N.C. ADMIN. CODE 02D.1902 and .1903 regarding opening burning. Changes would allow residential open burning of logs and stumps. A public hearing was held July 21, 2015, and the deadline for comment is August 14, 2015. See <http://www.ncoah.com/rules/register/Volume%2029%20Issue%2024%20June%2015,%202015.pdf> (pp. 2786-94).

SOUTH CAROLINA

WATER

The Department of Health and Environmental Control is proposing to amend S.C. CODE ANN. REGS. 61-50.C.7 and 61-50.D.6 regarding water quality in natural swimming areas. Changes would replace fecal coliform with *E. coli* as the indicator of bacteriological water quality in new and existing natural swimming areas. A public hearing will be held August 13, 2015. See 39 S.C. Reg. p. 23 (May 22, 2015), available at http://www.scstatehouse.gov/state_register.php.

RECENT JOURNAL LITERATURE

“Recent Journal Literature” lists recently published law review and other legal periodical articles. Within subject-matter categories, entries are listed alphabetically by author or title. Articles are listed first, followed by comments, notes, symposia, surveys, and bibliographies.

AIR

- Driesen, David M., *Putting a Price on Carbon: The Metaphor*, 44 ENVTL. L. 695 (2014).
Hatch, Rory, *Into Thin Air: Unconstitutional Taking by Preemption of State Common Law Under the Clean Air Act*, 33 REV. LITIG. 711 (2014).
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CLIMATE CHANGE

- Colares, Juscelino F. & Kosta Ristovski, *Pleading Patterns and the Role of Litigation as a Driver of Federal Climate Change Legislation*, 54 JURIMETRICS J. 329 (2014).
Walline, Conor J., *Executive Power and Regional Climate Change Agreements*, 31 PACE ENVTL. L. REV. 804 (2014).
Symposium, *Adaptation of the Built Environment to Achieve Resilience to Climate Change*, 47 J. MARSHALL L. REV. 487 (2013).
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- Boyd, William, *Public Utility and the Low-Carbon Future*, 45 ELR 10788 (Aug. 2015).
Carothers, Leslie, *Options for Regulating the Environmental Impacts of Hydraulic Fracturing*, 45 ELR 10752 (Aug. 2015).
Dana, David A. & Hannah J. Wiseman, *A Market Approach to Regulating the Energy Revolution: Assurance Bonds, Insurance, and the Certain and Uncertain Risks of Hydraulic Fracturing*, 45 ELR 10746 (Aug. 2015).
Early III, W. Blaine, *Bond What You Know and Insure What You Don't: A Comment on A Market Approach to Regulating the Energy Revolution*, 45 ELR 10756 (Aug. 2015).
Ferrigni, Lauren A., *The Use of Nanotechnology Within the Solar Industry: A Sustainability Perspective*, 54 JURIMETRICS J. 409 (2014).
FitzGerald, Tom, *Reflections on A Market Approach to Regulating the Energy Revolution*, 45 ELR 10760 (Aug. 2015).
Gaba, Jeffrey M., *Flowback: Federal Regulation of Wastewater From Hydraulic Fracturing*, 39 COLUM. J. ENVTL. L. 251 (2014).
Hatami, Valeriia, *The Solution to Unsound Science Behind Regulation of Hydraulic Fracturing Is . . . Traceable*, 39 OKLA. CITY U. L. REV. 209 (2014).
Kim, Esther Y., *Can You Sue the Government?: An Examination of the Legal Doctrines for Government Liability Regarding Their Involvement With Wind Power Development*, 39 COLUM. J. ENVTL. L. 319 (2014).

- LeGros, Susan Packard, *The Critical Role of Voluntary Standards and Certification in the Hydraulic Fracturing Framework*, 45 ELR 10741 (Aug. 2015).
Merrill, Thomas W. & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 45 ELR 10734 (Aug. 2015).
Robertson, Peter D., *Comment on The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination*, 45 ELR 10744 (Aug. 2015).
Scott, Inara, *Teaching an Old Dog New Tricks: Adapting Public Utility Commissions to Meet Twenty-First Century Climate Challenges*, 38 HARV. ENVTL. L. REV. 371 (2014).
Sovacool, Benjamin K. et al., *Innovations in Energy and Climate Policy: Lessons From Vermont*, 31 PACE ENVTL. L. REV. 651 (2014).
Tripp, James T.B. & Christopher J. Bateman, *Toward Greener FERC Regulation of the Power Industry*, 38 HARV. ENVTL. L. REV. 275 (2014).
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- Breggin, Linda K. et al., *Trends in Environmental Law Scholarship 2008-2014*, 45 ELR 10731 (Aug. 2015).
Bremer, Emily S., *A Multidimensional Problem*, 45 ELR 10783 (Aug. 2015).
Burke, Sharon E., *No Such Thing as a Green War or a Bad Peace*, 45 ELR 10770 (Aug. 2015).
Chandoo, Hanna, *The “Standing Dance”: How the Standing Doctrine Undermines Human Values and Overcomplicates Environmental Litigation*, 35 WHITTIER L. REV. 489 (2014).
Chertok, Mark A. & Daniel Mach, *Environmental Law*, 64 SYRACUSE L. REV. 717 (2014).
Emhardt, Andrew D., *Climate Change and the Inuit: Bringing an Effective Human Rights Claim to the United Nations*, 24 IND. INT'L & COMP. L. REV. 515 (2014).
Fiorino, Daniel J., *Streams of Environmental Innovation: Four Decades of EPA Policy Reform*, 44 ENVTL. L. 723 (2014).
Jin, Jing, *E-Waste and the Regulatory Commons: A Proposal for the Decentralization of International Environmental Regulation*, 39 BROOK. J. INT'L L. 1251 (2014).
Light, Sarah E., *The Military-Environmental Complex*, 45 ELR 10763 (Aug. 2015).
Mendelson, Nina A., *Taking Public Access to the Law Seriously: The Problem of Private Control Over the Availability of Federal Standards*, 45 ELR 10776 (Aug. 2015).
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Ray, Jeffery, *Offshore Safety and Environmental Regimes: A Post-Macondo Comparative Analysis of the United States and the United Kingdom*, 33 MISS. C.L. REV. 11 (2014).

- Schiffer, Lois, *Comments on Taking Public Access to the Law Seriously*, 45 ELR 10786 (Aug. 2015).
- Simpson, Amanda, *Remarks on The Military-Environmental Complex*, 45 ELR 10773 (Aug. 2015).
- Stillings, Zachary L., *Human Rights and the New Reality of Climate Change: Adaptation's Limitations in Achieving Climate Justice*, 35 MICH. J. INT'L L. 637 (2014).
- Trimble, Travis M., *Environmental Law*, 65 MERCER L. REV. 929 (2014).
- Tripolsky, Marissa, *A New NEPA to Take a Bite Out of Environmental Justice*, 23 B.U. PUB. INT. L.J. 313 (2014).
- Uhlmann, David M., *Prosecutorial Discretion and Environmental Crime*, 45 ELR 10801 (Aug. 2015).
- Wilson, Grant, *Murky Waters: Ambiguous International Law for Ocean Fertilization and Other Geoengineering*, 49 TEX. INT'L L.J. 507 (2014).

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- Lester, Michael, *Spreading Technology, Even When Ugly: Standardizing the Land Use Tests of Cellular Telecommunications Facilities Under the Telecommunications Act of 1996*, 82 UMKC L. REV. 801 (2014).
- Rice, Terry, *Zoning and Land Use*, 64 SYRACUSE L. REV. 993 (2014).
- Teyber, Edward, *Incorporating Third Party Green Building Rating Systems Into Municipal Building and Zoning Codes*, 31 PACE ENVTL. L. REV. 832 (2014).

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- Hults, David, *Environmental Regulation at the Frontier: Government Oversight of Offshore Oil Drilling North of Alaska*, 44 ENVTL. L. 761 (2014).
- Kirschner, Steven J., *Can't See the Forest for the Fees: An Examination of Recreational Fee and Concession Policies on the Natural Forests*, 14 WYO. L. REV. 513 (2014).

- Mackey, Katherine V., *Reforming "The Blob": Why California's Latest Approach to Amending CEQA Is a Bad Idea*, 39 COLUM. J. ENVTL. L. 357 (2014).
- Willms, David & Anne Alexander, *The North American Model of Wildlife Conservation in Wyoming: Understanding It, Preserving It, and Funding Its Future*, 14 WYO. L. REV. 659 (2014).
- Symposium, *International Law in a Time of Scarcity*, 42 GA. J. INT'L & COMP. L. 1 (2013).

TOXIC SUBSTANCES

- Watnick, Valerie J., *The Missing Link: U.S. Regulation of Consumer Cosmetic Products to Protect Human Health and the Environment*, 31 PACE ENVTL. L. REV. 595 (2014).

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- Symposium, *Contaminated Property*, 46 ARIZ. ST. L.J. 429 (2014).

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- Holloway, Caswell F. et al., *Solving the CSO Conundrum: Green Infrastructure and the Unfulfilled Promise of Federal-Municipal Cooperation*, 38 HARV. ENVTL. L. REV. 335 (2014).
- Lewis, Suzanne Timmons, *Domestic Solutions to the International Problem of Water Scarcity: Singapore, a Case Study*, 42 GA. J. INT'L & COMP. L. 247 (2013).
- Symposium, *Wyoming Water Law*, 14 WYO. L. REV. 327 (2014).

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Food, Agriculture, and Environmental Law

Mary Jane Angelo, Jason J. Czarnezki, and Bill Eubanks

In the groundbreaking *Food, Agriculture, and Environmental Law*, leading environmental legal scholars Angelo, Czarnezki, and Eubanks, along with five distinguished contributing authors, undertake an exploration of the challenging political and societal issues facing agricultural policy and modern food systems through the lens of environmental protection laws.

The authors seek to answer difficult questions about the need for new approaches to agricultural policy and environmental law to meet 21st century concerns surrounding climate change, sustainable agriculture, accessibility to healthy foods, and the conservation of national resources and ecosystem services. This is the first book to examine both the impact of agricultural policy on the environment and the influence of environmental law on food and agriculture.

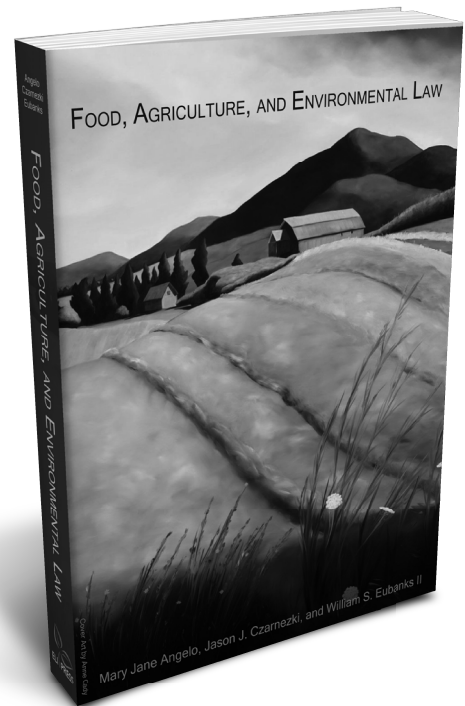
Food, Agriculture, and Environmental Law will serve as the quintessential text for bringing these issues to the classroom in a variety of fields, including law, public policy, agricultural economics, and environmental science.

About the Authors:

Mary Jane Angelo is a Professor of Law, Director of the Environmental and Land Use Law Program, and University of Florida Research Foundation Professor at the University of Florida Levin College of Law. She is also Affiliate Faculty in both the University of Florida School of Natural Resources and Water Institute.

Jason J. Czarnezki is the Gilbert & Sarah Kerlin Distinguished Professor of Environmental Law at Pace Law School. Prior to joining the Pace Law faculty, he was Professor of Law in the Environmental Law Center at Vermont Law School and faculty director of the U.S.-China Partnership for Environmental Law.

William S. "Bill" Eubanks II is a partner at the Washington D.C., law firm of Meyer Glitzenstein & Crystal, where he litigates complex federal environmental cases on behalf of conservation organizations.



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—Patrick A. Parenteau, Professor of Law and Senior Counsel to the Environmental and Natural Resources Law Clinic, Vermont Law School



Wetlands Deskbook

4TH Edition

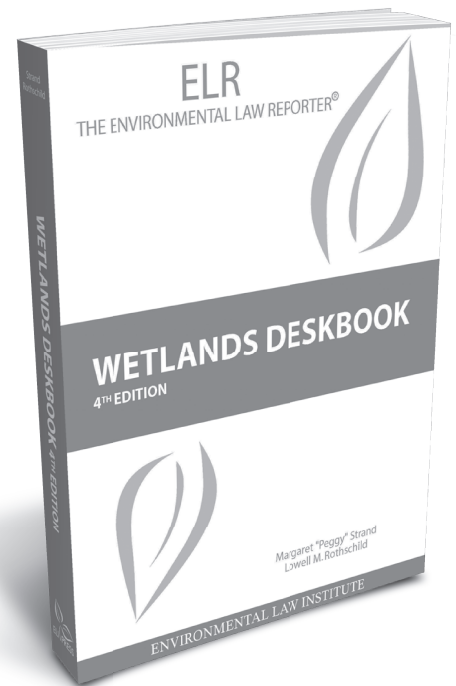
By Margaret "Peggy" Strand and Lowell M. Rothschild

Wetlands law operates at the junction of private-property rights and natural resource protection. While wetlands provide rich and diverse species habitat, protecting and promoting water quality, the vast majority of U.S. wetlands are on private property. Federal law addresses wetlands protection and development in a complex manner. Those interested in protecting wetlands or developing wetland property must navigate challenging legal waters.

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Margaret "Peggy" Strand is a partner at Venable, LLP in Washington, D.C. Ms. Strand has substantial experience advising on the regulatory requirements of federal and state law, including wetlands, natural resources, protected species, climate change, and pollution control. She was Chief of the Environmental Defense Section in the U.S. Justice Department, Environmental and Natural Resources Division, from 1984 to 1991, and served as a Justice Department trial attorney and supervisor since 1976.

Lowell Rothschild, Senior Counsel at Bracewell & Giuliani LLP in Washington, D.C., is an environmental litigator focusing on natural resource issues such as wetlands, endangered species, and environmental review. For over 20 years, he has represented private, public, governmental, and quasi-governmental clients working in the oil and gas, natural resource extraction, and infrastructure development sectors in obtaining and defending permits and responding to allegations of legal noncompliance, through both internal investigations and litigation.



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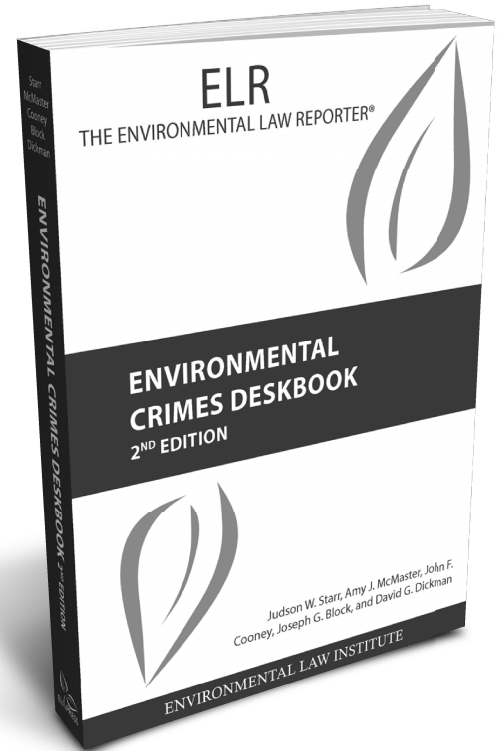
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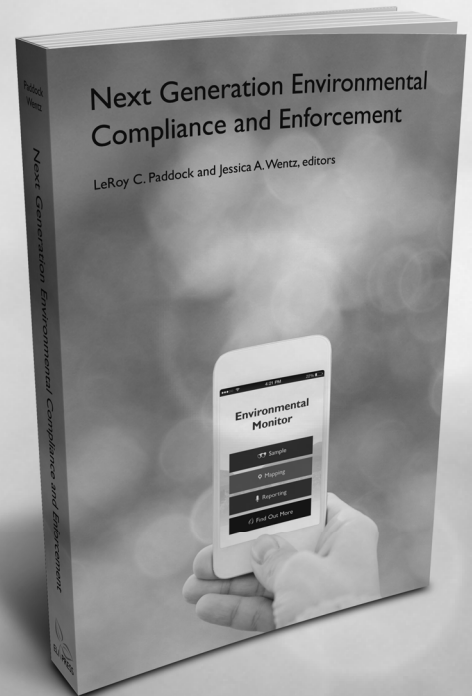
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