

COOPERATIVE FEDERALISM AND HYDRAULIC FRACTURING: A HUMAN RIGHT TO A CLEAN ENVIRONMENT

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This Article argues that filling the energy governance gaps regarding unconventional natural gas can best be accomplished through collaborative governance that is genuinely adaptive and cooperative. Through cooperative federalism, combined with procedural rights for inclusive, innovative decision-making, state and non-state actors should design and implement the requisite safeguards before further natural gas development advances.

Hydraulic fracturing provisions are strikingly fragmented and have sparked a fierce debate about chemical disclosure, radioactive wastewater disposal, and greenhouse gas emissions. United States natural gas production may stunt the direction and intensity of renewable energy by up to two decades and will not provide a bridge to a sound energy policy if it “erode[s] efforts to prepare a landing at the other end of the bridge.”¹ Unconventional natural gas extraction need not become a transition to a new addiction. This Article analyzes how cooperative federalism and inclusive decision-making can provide legitimacy and transparency when balancing property rights against police powers to regulate natural gas production.

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¹ Henry D. Jacoby et al., *The Influence of Shale Gas on U.S. Energy and Environmental Policy*, 1 *ECON. OF ENERGY & ENVTL. POL'Y* 37, 38, 50 (2012), available at http://globalchange.mit.edu/files/document/MITJPSPGC_Reprint_12-1.pdf.

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INTRODUCTION

The complex dynamics of the energy debate continue to divide as we transition from foreign fossil-fuel reliance to domestic water insecurity. Regulatory commons issues are not new, yet hydraulic fracturing presents unique regulatory challenges in the wake of recent exemptions to United States federal environmental law. Filling the regulatory gaps governing unconventional natural gas is best accomplished through genuinely adaptive and collaborative governance. Inclusive cooperative federalism can facilitate identifying and implementing substantive energy siting best-practices. This Article provides a framework for moving from fragmentation towards iterative coordinated public regulation and meaningful non-state actor involvement that does not illegitimately capture energy governance.

As hydraulic fracturing and horizontal drilling intensify, so do calls for greater transparency and public participation in order to balance the following three interdependent sustainability dimensions: environmental protection, social equity, and economic stability. While media coverage on hydrofracking fluid toxicity has raised public awareness, this Article

contributes a new cooperative federalism and inclusive decision-making (dynamic federalism) framework with which to fill the hydraulic fracturing governance gaps. In doing so, this Article highlights legitimacy and transparency considerations when balancing property rights against police powers in order to operationalize the precautionary principle when regulating unconventional natural gas.

The central focus of this Article is to sketch the contours of how cooperative federalism, combined with procedural rights for inclusive decision-making, can provide the requisite safeguards before further natural gas development advances.

Part I of this Article discusses unconventional natural gas in the context of coordinating energy-water-climate governance.

Part II evaluates current federal regulatory limitations. Protecting public health and environmental integrity depends upon greater regulation of hydraulic fracturing. The United States Environmental Protection Agency (EPA) provides rulemaking on how the flaring and leakage of methane can begin the process of internalizing negative externalities.

Part III analyzes the suit against the federal government that called for the federal government to conduct an environmental impact review of hydraulic fracturing in the Delaware River Basin.

In contrast, Part IV assesses federal, local, and civil society critiques of New York's revised environmental impact review.

Part V sets forth recommendations to strengthen energy-water-climate governance. This Article concludes that cooperative federalism and inclusive decision-making can facilitate both a human right to a clean environment and energy security.

I. COORDINATING ENERGY-WATER-CLIMATE COLLABORATIVE GOVERNANCE

This Article argues that filling the regulatory gaps governing unconventional natural gas can best be accomplished through collaborative governance that is genuinely adaptive and cooperative. Through cooperation at all levels of governance combined with procedural rights for inclusive decision-making, state and non-state actors should design and implement the requisite safeguards before further natural gas development advances are made.

Hydraulic fracturing provisions are strikingly fragmented and have sparked a fierce debate regarding chemical disclosure, radioactive wastewater disposal, and greenhouse gas emissions. Flaring natural gas flies in the face of efforts to address climate change. The EPA's Natural Gas STAR Program explains that natural gas extraction brings the greenhouse gas methane to the surface, where it is twenty-one times more potent at trapping heat in the atmosphere over a one-hundred year period

than carbon dioxide.² An MIT study indicates that ramping up natural gas may stunt renewable energy development by up to two decades.³ As the scope of carcinogenic, radioactive, and climate impacts of unconventional natural gas development become better known, public safety must be addressed through health and environmental impact assessments.⁴ Public participation in early energy decision-making can help prevent human rights violations that result when heavy industry is sited amidst residential communities and within drinking watersheds.

Residents in Pennsylvania have learned that faulty well installation can compromise potable water sources.⁵ While conventional gas is extracted from permeable reservoirs, unconventional gas can be reached through fracturing rock formations.⁶ A combination of horizontal drilling and hydraulic fracturing has expanded access to unconventional gas found in a range of formations, including shale, coalbeds, and sandstones.⁷ This Article will focus on unconventional natural gas development rather than the narrower hydraulic fracturing step of injecting water, sand, and chemicals underground to release natural gas from cracks in rocks.⁸ The media has focused on the term hydraulic fracturing, preferring the shorthand “fracking.”⁹ Yet faulty cementing, wastewater, and a myriad of related concerns are as important as the specific industrial practice of opening cracks in shale using high-pressure meth-

² See ENVTL. PROT. AGENCY, NATURAL GAS STAR PROGRAM, <http://www.epa.gov/gasstar/basic-information/index.html> (last visited Oct. 24, 2012).

³ See Jacoby et al., *supra* note 1, at 50.

⁴ See Owen L. Anderson, *Subsurface “Trespass”: A Man’s Subsurface is Not His Castle*, 49 WASHBURN L.J. 247, 282 (2010); see also John W. Broomes, *Wrestling with a Downhole Dilemma: Subsurface Trespass, Correlative Rights, and the Need for Hydraulic Fracturing in Tight Reservoirs*, 53 ROCKY MTN. MIN. L. INST. 20-1, 20-13 (2007).

⁵ See David Biello, *What the Frack? Natural Gas from Subterranean Shale Promises U.S. Energy Independence—With Environmental Costs*, SCI. AM., Mar. 30, 2010, <http://www.scientificamerican.com/article.cfm?id=shale-gas-and-hydraulic-fracturing>.

⁶ See *id.*

⁷ See *id.*

⁸ The given hydrofracking ratio depends on specific well conditions. See ENVTL. PROT. AGENCY, DRAFT PLAN TO STUDY THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES 19 (2011), available at [http://yosemite.epa.gov/sab/sabproduct.nsf/0/D3483AB445AE61418525775900603E79/\\$File/Draft+Plan+to+Study+the+Potential+Impacts+of+Hydraulic+Fracturing+on+Drinking+Water+Resources-February+2011.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/0/D3483AB445AE61418525775900603E79/$File/Draft+Plan+to+Study+the+Potential+Impacts+of+Hydraulic+Fracturing+on+Drinking+Water+Resources-February+2011.pdf) [hereinafter EPA DRAFT STUDY PLAN].

⁹ The term hydraulic fracturing has come to mean different things to different stakeholders. To natural gas operators it refers to a very specific part of the natural gas production process, while the general public has a wider interpretation encompassing the lifecycle of natural gas extraction. The latter interpretation broadens the discussion to address negative impacts that result from steps before and subsequent to the actual hydraulic fracturing stage of opening fissures in a rock formation by blasting water, sand, and chemicals. For a broad overview, see Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115, 117 (2009).

ods. In other words, public debate has only recently expanded to encompass not only hydraulic fracturing but also the entire unconventional natural gas extraction process and its substantial challenges to public health and environmental integrity.

Hydraulic fracturing involves injecting water, chemicals, and a proppant, such as sand, to hold rock formation fractures open and release trapped gas.¹⁰ Slickwater hydraulic fracturing fluid often contains diesel, formaldehyde, and acids from the outset and picks up heavy concentrations of salts, minerals, and radioactive materials from rock formations.¹¹ The 2010 documentary *Gasland* raised public concern over slickwater and gas migration into surface and groundwater supplies.¹² The Academy of Natural Sciences has found that drilling impacts watershed indicator species.¹³

Drilling operators say that the thousands of feet between hydraulic fracturing operations and aquifers, combined with casing regulations and the ratio of water to chemicals, adequately protect the environment.¹⁴ At the same time, companies acknowledge that cement casing technology needs to be developed further¹⁵ and that Pennsylvania drillers have violated environmental regulations.¹⁶

Regulatory coordination is lacking with regard to unconventional natural gas extraction and its health and environmental impacts. The water intensity of hydraulic fracturing is particularly challenging. Both water availability and quality issues are coming to the forefront as unconventional natural gas extraction expands. Unprecedented water withdrawals threaten aquatic habitat and overly rapid aquifer depletion. Generally, flowback is treated (1) at publicly-owned sewage treatment works (POTWs), raising radioactivity concerns,¹⁷ (2) injected into under-

¹⁰ See U.S. DEP'T OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER ES-4 (2009), available at http://www.netl.doe.gov/technologies/oil-gas/publications/epereports/shale_gas_primer_2009.pdf.

¹¹ See generally *id.*

¹² See *GASLAND* (Int'l WOW Co. 2010), more information available at <http://gaslandthemovie.com/about-the-film/synopsis>.

¹³ See Press Release, Acad. of Natural Sciences, Marcellus Shale Needs Scientific Study to Set Guidelines (Oct. 12, 2010), available at http://www.ansp.org/about/press-room/releases/2010/-/media/Files/ans/about/press/releases/2010/Marcellus_Shale_environmental_impact_10-10doc.ashx.

¹⁴ See generally William S. Friedlander, *Poisoned Wells: Dangers of Natural Gas Drilling*, 47 TRIAL 16 (2011).

¹⁵ See generally *id.*

¹⁶ See generally *id.*; see also Press Release, Pa. Dep't of Env'tl. Prot., DEP Takes Aggressive Action Against Cabot Oil & Gas Corp to Enforce Environmental Laws, Protect Public in Susquehanna County (Apr. 15, 2010), available at <http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=10586&typeid=1>.

¹⁷ ENVTL. PROT. AGENCY, EPA COMMENTS ON REVISED DRAFT NYSDEC REVISED DSGEIS FOR HORIZONTAL DRILLING AND HIGH-VOLUME HYDRAULIC FRACTURING TO DEVELOP THE MARCELLUS SHALE AND OTHER LOW-PERMEABILITY GAS RESERVOIRS 2 (2012),

ground injection wells, raising seismicity concerns,¹⁸ and (3) stored in onsite and central industrial facilities, raising leakage and long-term feasibility concerns. Spills, leaks, runoff, and improper construction, drilling, and disposal all intensify pollution levels.¹⁹

Water treatment plants have been ill-prepared to treat the flowback of hydraulic fracturing fluid, particularly given the naturally occurring radium that flows back with the artificially added chemicals.²⁰ Water treatment plants discharge into large rivers that in turn are relied upon for drinking water. Radioactive contamination presents a regional public health challenge.²¹ It also illustrates the complexity of pinpointing liability when hydrofracking operators do not deliberately add radioactive materials to hydraulic fracturing fluid. Environmental pollution governance generally suffers because of its compromised ability to isolate harm caused by any given actor. A range of commercial and industrial facilities can adversely impact surface water and groundwater.²² Industry use of intellectual property law has further complicated the process of tracing a contaminant back to a given source. Generally, operators have contended that they do not have to disclose the ratio of chemicals added to hydrofracking fluids at any given site due to proprietary privileges under trade secret provisions.²³ Well-resourced lobbying resulted in the dismantling of federal provisions that would have provided environmental and human health thresholds.

Remaining federal regulatory capacity is fragmented. For instance, the EPA's Mandatory Greenhouse Gas Reporting Program²⁴ encompasses methane and carbon dioxide emissions reporting for distributors and facilities emitting over 25,000 metric tons of greenhouse gases annually.²⁵ Yet, the EPA has yet to require greenhouse gas emission reduc-

available at <http://www.epa.gov/region2/newsevents/pdf/EPA%20R2%20Comments%20Revised%20dSGEIS%20Enclosure.pdf> [hereinafter EPA COMMENTS].

¹⁸ See *4.0 Earthquake Strikes in Northeast Ohio*, USA TODAY, Dec. 31, 2011, <http://www.usatoday.com/news/nation/story/2011-12-31/northeast-ohio-earthquake/52307134/1> [hereinafter *4.0 Earthquake*] ("Officials said Saturday they believe the latest earthquake activity in northeast Ohio is related to the injection of wastewater into the ground near a fault line, creating enough pressure to cause seismic activity.")

¹⁹ EPA DRAFT STUDY PLAN, *supra* note 8, at 25.

²⁰ See Mark A. Latham, *The BP Deepwater Horizon: A Cautionary Tale for CCS, Hydrofracking, Geoengineering and Other Emerging Technologies with Environmental and Human Health Risks*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 31, 55 (2011).

²¹ See generally Ian Urbina, *Regulation Lax as Gas Wells' Tainted Water Hits Rivers*, N.Y. TIMES, Feb. 27, 2011, at A1.

²² See David H. Getches, *Groundwater Quality Protection: Setting a National Goal for State and Federal Programs*, 65 CHI.-KENT L. REV. 387, 409 (1989); see also Latham, *supra* note 20, at 56.

²³ See EPA DRAFT STUDY PLAN, *supra* note 8, at 25.

²⁴ See generally 40 C.F.R. § 98 (2011).

²⁵ See *id.* at § 98.2.

tions through this program.²⁶ This program, combined with the EPA's Tailoring Rule,²⁷ do not adequately incentivize greenhouse gas mitigation.

In the context of drinking water, when wells lack proper casing and cementing, stray gas can migrate from the wellbore into water supplies and residences. A Duke University study found drinking water methane concentrations to be seventeen times higher in active drilling and extraction areas than in non-active areas.²⁸ Few environmental or public health advocates at present have a comprehensive understanding of gas engineering and law, state-specific mineral leasing requirements, or intellectual and other property law dimensions. Article I of the United States Constitution empowers Congress to promote innovation by protecting discoveries.²⁹ The federal government can also override patent protection to protect the public.³⁰ A profound lack of understanding regarding the threat posed to water supplies by unconventional natural gas extraction presents a level of scientific uncertainty that justifies precaution.

A. *United States Pioneering Collaborative Governance*

Uma Outka has analyzed the environmental justice implications of the National Environmental Policy Act's (NEPA)³¹ structural

²⁶ See *id.* § 98.1.

²⁷ The list includes carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. See ENVTL. PROT. AGENCY, FINAL RULE: PREVENTION OF SIGNIFICANT DETERIORATION AND TITLE V GREENHOUSE GAS TAILORING RULE (2010), available at <http://www.epa.gov/NSR/documents/20100413fs.pdf>.

²⁸ See Stephen G. Osborn et al., *Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic Fracturing*, 108 PROC. NAT'L ACAD. SCI. 8172, 8173 (2011), available at <http://www.nicholas.duke.edu/cgc/pnas2011.pdf>.

²⁹ Congress is empowered to "promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." U.S. CONST. art. I, § 8, cl. 8 (the "Copyright Clause").

³⁰ 28 U.S.C. § 1498 (2011); see generally Elizabeth Burleson & Winslow Burleson, *Innovation Cooperation: Energy Biosciences and Law*, 2011 U. ILL. L. REV. 651 (2011).

³¹ See National Environmental Policy Act of 1969, Pub. L. No. 91-190, 83 Stat. 852 (codified as amended at 42 U.S.C. § 4321 et seq. (2006)); see also *N.Y. v. U.S. Army Corps of Eng'rs*, No. 11-CV-2599, 11-CV-3857, 11-CV-3780, 2012 U.S. App. WL 4336701, at *2 (E.D.N.Y. Sept. 24, 2012) ("NEPA has 'twin aims': it imposes on federal agencies 'the obligation to consider every significant aspect of the environmental impact of a proposed action,' and it 'ensures that the agency will inform the public that it has indeed considered environmental concerns in its decision-making process.'" *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983). A federal agency must prepare what is called an environmental impact statement ('EIS') to accompany a federal action, which includes 'projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; [and] new or revised agency rules, regulations, plans, policies, or procedures.' 40 C.F.R. § 1508.18(a). An EIS should include '(i) the environmental impact of the proposed action, (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented, (iii) alternatives to the proposed action, (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and (v) any irreversible and irretrievable commitments of resources which

gaps.³² According to the EPA:

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.³³

President Clinton's 1994 Executive Order on "Environmental Justice in Minority and Low-Income Populations" paved the way for federal agencies to identify and address health and environmental impacts on environmental justice.³⁴ The Order did not set forth a private cause of action,

would be involved in the proposed action should it be implemented.' 42 U.S.C. § 4332(C)(i)-(v).").

³² Luke Cole, Robert Kuehn, Clifford Rechtschaffen, and María Ramírez Fisher have provided crucial United States environmental justice critiques, while Svitlana Kravchenko, John Bonine, Nick Robinson, Dina Shelton, Don Anton, Marcos Orellana, James May, and Erin Daly are among the pioneer scholars analyzing international and comparative human rights and the environment. See Uma Outka, *NEPA and Environmental Justice: Integration, Implementation, and Judicial Review*, 33 B.C. ENVTL. AFF. L. REV. 601, 601 (2006); see also DONALD ANTON & DINAH SHELTON, ENVIRONMENTAL PROTECTION AND HUMAN RIGHTS (2011); LUKE W. COLE & SHEILA R. FOSTER, FROM THE GROUND UP: ENVIRONMENTAL RACISM AND THE RISE OF THE ENVIRONMENTAL JUSTICE MOVEMENT (2001); ERIN DALY & JAMES MAY, CONTEMPORARY PRINCIPLES IN CONSTITUTIONAL ENVIRONMENTAL LAW (ELI/ABA 2011); SVITLANA KRAVCHENKO & JOHN E. BONINE, HUMAN RIGHTS AND THE ENVIRONMENT: CASES, LAW, AND POLICY 261 (1st ed. 2008); ORELLANA & JOHL, CTR. FOR INT'L ENVTL. LAW, CLIMATE CHANGE AND HUMAN RIGHTS: A PRIMER (May 2011); NICHOLAS A. ROBINSON & LAL KURUKULASURIYA, U.N. ENV'T PROGRAMME, TRAINING MANUAL ON INTERNATIONAL ENVIRONMENTAL LAW (2006); Elizabeth Burleson & Diana Pei Wu, *Collaborative Community-Based Natural Resource Management*, 21 FORDHAM ENVTL. L. REV. 201 (2010); Elizabeth Burleson, *Making Sand Castles as the Tide Comes In: Legal Aspects of Climate Justice*, 2 J. ENERGY & ENVTL. L. 42 (2011); María Ramírez Fisher, *On the Road from Environmental Racism to Environmental Justice*, 5 VILL. ENVTL. L.J. 449, 449-52 (1994); Robert R. Kuehn, *A Taxonomy of Environmental Justice*, 30 ENVTL. L. REP. 10681, 10681 (2000); Clifford Rechtschaffen, *Advancing Environmental Justice Norms*, 37 U.C. DAVIS L. REV. 95, 96 (2003); Nicholas A. Robinson, *International Trends in Environmental Impact Assessment (1991 Bellagio Conference on U.S.-USSR Environmental Protection Institutions)*, 19 B.C. ENVTL. AFF. L. REV. 591 (1992); Gerald Torres, *Introduction: Understanding Environmental Racism*, 63 U. COLO. L. REV. 839, 839-40 (1992).

³³ ENVTL. PROT. AGENCY, ENVIRONMENTAL JUSTICE HOME, <http://www.epa.gov/compliance/environmentaljustice/> (last visited Sept. 24, 2012).

³⁴ See Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, Exec. Order No. 12898, 59 Fed. Reg. 7629 (Feb. 11, 1994) (mandating that each federal agency make "environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations"), amended by Exec. Order No. 12948, 60 Fed. Reg. 6381 (Jan. 30, 1995); see also

but did task federal agencies with the mission of integrating environmental justice into their activities.³⁵ Public participation is a core aspect of environmental justice and has been required of federal agencies by NEPA.³⁶

NEPA requires federal agencies to write an environmental impact statement for “major federal actions significantly affecting the quality of the human environment,”³⁷ including: issuing federal permits, establishing government policies/regulations, undertaking/authorizing federal projects, and activities potentially subject to federal control and responsibility.³⁸ Conducting environmental assessments³⁹ enables federal agencies to decide whether to go on to an entire environmental impact statement based on “‘a reasonably close causal relationship’” between the environmental effect and the alleged cause.⁴⁰ Alternatively, a federal agency can declare a Finding of No Significant Impact (FONSI) and end environmental review.⁴¹

A crucial provision in NEPA relates to timeframe. Federal agencies are to conduct their environmental review “at the earliest possible time” in a given planning process. This is central to awareness regarding adverse environmental impacts and potential alternatives genuinely informing decision-making.⁴²

The environmental impact statement process requires a reasonable alternatives analysis that includes seriously considering no action.⁴³ It also encompasses consideration of direct, indirect, and cumulative impacts that affect health, environmental, social, and economic resources.⁴⁴

Omar Saleem, *Overcoming Environmental Discrimination: The Need for a Disparate Impact Test and Improved Notice Requirements in Facility Siting Decisions*, 19 COLUM. J. ENVTL. L. 211, 213–22 (1994).

³⁵ Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, Exec. Order No. 12898, 59 Fed. Reg. 7629 (Feb. 11, 1994).

³⁶ See 42 U.S.C. §§ 4321–4347 (2000); EXEC. OFFICE OF THE PRESIDENT, COUNCIL ON ENVTL. QUALITY, *THE NATIONAL ENVIRONMENTAL POLICY ACT: A STUDY OF ITS EFFECTIVENESS AFTER TWENTY-FIVE YEARS* 1–2 (1997), available at <http://ceq.hss.doe.gov/nepa/nepa25fn.pdf> [hereinafter COUNCIL ON ENVTL. QUALITY]; see also ENVTL. PROT. AGENCY, *FINAL GUIDANCE FOR INCORPORATING ENVIRONMENTAL JUSTICE CONCERNS IN EPA’S NEPA COMPLIANCE ANALYSES* § 1.0 (1998), available at http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_epa0498.pdf [hereinafter EPA GUIDANCE]; see generally ENVTL. PROT. AGENCY, *REGION 4: ENVIRONMENTAL JUSTICE*, <http://www.epa.gov/region4/ej/resources.html> (last visited Sept. 24, 2012).

³⁷ See 42 U.S.C. § 4332(C) (2000).

³⁸ See 40 C.F.R. § 1508.18 (2005).

³⁹ See 40 C.F.R. § 1501.3.

⁴⁰ *Dep’t of Transp. v. Pub. Citizen*, 541 U.S. 752, 754 (2004) (quoting *Metro. Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 774 (1983)); see 40 C.F.R. § 1508.27.

⁴¹ See 40 C.F.R. § 1501.4.

⁴² See *id.* § 1501.2.

⁴³ See *id.* § 1502.14.

⁴⁴ See *id.* §§ 1508.8, 1508.14, 1508.25.

Once a draft environmental impact statement has been completed, NEPA requires the agency to solicit and respond in a specific and affirmative manner to potentially affected individuals as well as relevant federal, state, and local agencies.⁴⁵ Furthermore, NEPA facilitates inclusive decision-making by requiring the agency to involve the public. In doing so, NEPA calls for public disclosure of comments and underlying documents, notification, and public meetings.⁴⁶ NEPA requires federal agencies to include their responses to public comments in their final environmental impact statement.⁴⁷ None of these requirements holds an agency to the most environmentally favorable option,⁴⁸ yet NEPA does set forth procedural measures to ensure informed decision-making. Environmental impacts may not prevent an action, but actions should not commence without adequate understanding of environmental consequences.⁴⁹ Thus, NEPA places environmental analysis squarely on the agenda of federal decision-making and facilitates access to information and public participation.⁵⁰

The Council on Environmental Quality Guidance calls upon federal agencies to recognize factors that may amplify adverse environmental impacts for certain communities and strategize ways to surmount barriers to meaningful participation by a broad array of stakeholders.⁵¹ I argue that a crucial environmental justice decision conducted by federal agencies involves determining whether to conduct a full environmental impact statement for a proposed action.⁵² Generally, NEPA reviews are done via preliminary environmental assessments, not a full environmental impact statement.⁵³

It is important to note that NEPA regulations call on agencies to involve the public in preparing environmental assessments yet also be mindful of the reality that NEPA only requires public participation with regard to notice and comment provisions for a draft environmental impact statement.⁵⁴ In other words, civil society participation in inclusive environmental decision-making rests on the determination of significant

⁴⁵ See *id.* § 1503.1.

⁴⁶ See *id.* § 1506.6.

⁴⁷ See *id.* §§ 1502.9, 1505.2.

⁴⁸ See *id.* § 1505.2.

⁴⁹ See *id.* § 1500.1(c).

⁵⁰ See *id.* §§ 1500.1(c), 1506.6.

⁵¹ COUNCIL ON ENVTL. QUALITY, *supra* note 36, at 8–9; Outka, *supra* note 32, at 612 (citing *Anchorage v. United States*, 980 F.2d 1320, 1328 (9th Cir. 1992); *Webb v. Gorsuch*, 699 F.2d 157, 159–60 (4th Cir. 1983)).

⁵² See COLE & FOSTER, *supra* note 32, at 196–97.

⁵³ See Stephen M. Johnson, *NEPA and SEPA's in the Quest for Environmental Justice*, 30 LOY. L.A. L. REV. 565, 570 (1997).

⁵⁴ See 40 C.F.R. § 1506.6(a) (2005).

environmental impact.⁵⁵ I argue that the federal agency has to be conscientious enough on its own to recognize substantial environmental impacts before NEPA requires the agency to engage with the general public to identify ramifications and alternatives.

B. *Balancing Equity and Efficiency in Collaborative Governance*

In a related forthcoming article, I explore how dynamic network governance can engage relevant actors in (1) information gathering/sharing, (2) inclusive decision-making, and (3) community-driven implementation. This global legal pluralism argument weaves together ethics, economics and environmental law to offer dynamic network governance theory as an overarching approach.⁵⁶ Economic market failures, socially inequitable resource access, and governance inertia to sustain environmental integrity can be addressed in the aggregate through dynamic governance collective action to complement discrete efforts underway at multiple levels of governance. It argues that norm building that occurs through these networks enhances inclusive/deliberative decision-making and socially-grounded implementation. Here, I focus on the qualitative case study of how inclusive cooperative governance can help close unconventional natural gas extraction governance gaps.

Sean Nolon has considered notions of equity, cultural perception of risk, and attribution of causes in the context of energy siting. He explains that discounting civil society involvement as costly and time-consuming misses several important points of governance. For instance, siting decisions often “impose significant, uncompensated burdens on communities”⁵⁷ and collaborative governance⁵⁸ can enhance sustainable development. Process can profoundly impact outcome. Nelson Mandela’s inviting a powerful Afrikaans resistance group leader into his home enhanced reconciliation and capacity for cooperative South African governance. In the context of environmental justice, such trust building is important.⁵⁹ Calling for people to care, openly and for the long-term, Elisabeth Radow explains that, “[p]ublic participation processes in which the dialogue manifests in open communication, collaborative interaction and transformed individual perspectives results in a

⁵⁵ See EPA GUIDANCE, *supra* note 36, §§ 1.0, 4.1.

⁵⁶ Elizabeth Burleson, *Dynamic Network Governance*, __ GEO. INT’L ENVTL. L. REV. (forthcoming 2013).

⁵⁷ Sean F. Nolon, *Negotiating the Wind: A Framework to Engage Citizens in Siting Wind Turbines*, 12 CARDOZO J. CONFLICT RESOL. 327, 331 (2011) (noting that “successful citizen involvement is more than a statement of principle—it must be implemented following the best practices of consensus building and collaboration.”).

⁵⁸ See Jody Freeman, *Collaborative Governance in the Administrative State*, 45 UCLA L. REV. 1, 13 (1997).

⁵⁹ See Nolon *supra* note 57, at 331.

greater likelihood of reasoned outcomes, which ultimately account for the common and varied interests of all involved parties.”⁶⁰

In the vacuum of regulation, civil society organizing has included sharing information via the Internet and public forums. Good governance involves inclusive decision-making at the outset, when public participation can inform a precautionary approach⁶¹ to energy policy, rather than after-the-fact dispute resolution.

From Tunisia,⁶² to Egypt,⁶³ to the United States,⁶⁴ ordinary individuals have gathered to express collective desperation. High cost of living, corruption, and unemployment drive resistance.⁶⁵ Kurt Andersen argues that “democracy is difficult and sometimes a little scary. Because deciding what you don’t want is a lot easier than deciding and implementing what you do want, and once everybody has a say, *everybody has a say*.”⁶⁶ This is an unpredictable process. Inclusive decision-making provides a best practice that can avert social unrest and balance sustainable development.

Informed, inclusive decision-making may locate sensible places to extract natural gas that do not compromise public health and environmental integrity. Some communities are in a position to determine whether gas production should occur, while many communities find themselves already contending with natural gas production and seek inclusive decision-making forums to identify best practices.⁶⁷

While the ingredients of good governance are well known, implementing transparency and inclusive decision-making in the context of energy siting remains challenging. The EPA explains that:

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmen-

⁶⁰ Elisabeth N. Radow, *Citizen David Tames Gas Goliaths on the Marcellus Shale Stage: Citizen Action as a Form of Dispute Prevention in the Internet Age*, 12 CARDOZO J. CONFLICT RESOL. 373, 395 (2011) (“The decision-making process occurs over time in an evolving international landscape regarding the boom or bust economic forecast of the drilling investment itself, growing numbers of incidents of environmental and human catastrophes, states and private parties in growing need of revenue and the resulting politics.”).

⁶¹ See Daniel Bodansky, *Scientific Uncertainty and the Precautionary Principle*, ENV’T, Sept. 1991, at 4.

⁶² Kurt Andersen, *The Protester*, TIME, Dec. 26, 2011, at 54, 70, available at http://www.time.com/time/specials/packages/article/0,28804,2101745_2102132_2102373,00.html.

⁶³ See *id.* at 58. Regime-changing protests were sparked by fraudulent elections. See *id.* At least 4.5 million Egyptians protested. *Id.* at 70.

⁶⁴ See *id.* at 58.

⁶⁵ See *id.* at 72.

⁶⁶ *Id.* at 78 (emphasis in original).

⁶⁷ See Radow, *supra* note 60, at 390.

tal laws, regulations, and policies. Achieving environmental justice is an Agency-wide priority (USEPA, 2010d), and is therefore considered in this study plan. There are concerns that hydraulic fracturing may adversely affect some communities that may be more likely to be exposed to harmful chemical contaminants as a result of fracturing activities, particularly through contaminated drinking water resources. Stakeholders have raised concerns about the environmental justice implications of gas drilling operations, noting that people with a lower socioeconomic status may be more likely to consent to drilling arrangements because they may not have the resources to engage with policymakers and agencies to affect alternatives. Additionally, drilling agreements are between landowners and well operators, implying that tenants and neighbors may have little or no input in the decision-making process.⁶⁸

It is difficult to reach the environmental justice elements of rights of access to information and public participation when federal agencies issue FONSI without involving civil society.⁶⁹ When, and if, a federal agency decides to prepare an environmental impact statement, the Council on Environmental Quality regulations calls for notice of intent to be published in the Federal Register.⁷⁰ Public participation measures kick in at this stage as agencies affirmatively request responses to a draft environmental impact statement.⁷¹ Unfortunately, such public participation is solicited well into the decision-making process and only if an environmental impact statement is conducted.⁷² Furthermore, institutional momentum tends to propel federal agencies toward completing the federal action rather than putting on the brakes and calling for no action. Thus, the earliest stages of decision-making are a far more sensible stage at which to genuinely involve impacted stakeholders and seriously consider no action as a viable option.

Enhancing federal environmental law's access to information, public participation, and access to justice provisions can overcome the substantial barriers to environmental justice encountered given NEPA's limited structure and timing of public participation measures.⁷³ Making initial outreach more robust at the earliest preliminary environmental as-

⁶⁸ EPA DRAFT STUDY PLAN, *supra* note 8, at 49.

⁶⁹ See COLE & FOSTER, *supra* note 32, at 111.

⁷⁰ 40 C.F.R. § 1501.7 (2005).

⁷¹ *Id.* § 1503.1(a)(4).

⁷² See EPA GUIDANCE, *supra* note 36, § 4.1; COLE & FOSTER, *supra* note 32, at 111.

⁷³ See COLE & FOSTER, *supra* note 32, at 111.

assessment stage can avert the perception of civil society being “appealed rather than an actual part of the decisionmaking process.”⁷⁴

Actions pursuant to the Clean Air Act⁷⁵ may not be required to implement NEPA’s full public participation measures. This leaves access to information and public participation unpredictable.⁷⁶ Cooperative federalism has led to curtailed NEPA scope when states administer the Clean Air Act, Clean Water Act,⁷⁷ and the Resource Conservation and Recovery Act (RCRA).⁷⁸ State action under these statutes may not be federal action pursuant to NEPA.⁷⁹ The EPA review also may not trigger NEPA.⁸⁰ Yet many states have little NEPAs, or SEPAs, that include environmental justice provisions. Actions that trigger neither NEPA nor SEPA requirements for inclusive decision-making continue to result in unsustainable development.⁸¹

Procedural rights to inclusive decision-making should not be set aside under “functional equivalent” provisions on the grounds that other statutes are more specialized, and, thus, NEPA review would be redundant.⁸² Stephen Johnson argues that NEPA functionally equivalent measures should be enhanced to require substantially equivalent public participation and other environmental justice factors.⁸³

While NEPA does not include a citizen suit provision, private enforcement of NEPA provisions may be pursued under the Administrative Procedure Act’s (APA)⁸⁴ general private right of action for judicial review of final agency actions.⁸⁵ Such APA review can include agency action that is unreasonably delayed, arbitrary, capricious, or an abuse of discretion.⁸⁶ Reviewing courts will defer to agency actions, given the agency’s area of discretion,⁸⁷ if the agency “has considered the relevant

⁷⁴ See Outka, *supra* note 32, at 610.

⁷⁵ 42 U.S.C. § 7401 et seq. (2000).

⁷⁶ See EPA GUIDANCE, *supra* note 36, § 1.2.1.

⁷⁷ 33 U.S.C. § 1251 et seq. (2011); see also Elizabeth Burleson, *Tribal, State, and Federal Cooperation to Achieve Good Governance*, 40 AKRON L. REV. 207 (2007) (analyzing federal, state, and tribal cooperative good governance pursuant to the Clean Water Act).

⁷⁸ 42 U.S.C. § 6901 et seq. (2000).

⁷⁹ See Johnson, *supra* note 53, at 595 n.126.

⁸⁰ *Id.*

⁸¹ See *id.* at 568–69.

⁸² See *Env’tl. Def. Fund, Inc. v. EPA*, 489 F.2d 1247, 1256 (D.C. Cir. 1973).

⁸³ See Johnson, *supra* note 53, at 596.

⁸⁴ 5 U.S.C. §§ 702, 704 (2000).

⁸⁵ *Id.*

⁸⁶ *Id.* § 706.

⁸⁷ See *Dep’t of Transp. v. Pub. Citizen*, 541 U.S. 752, 763 (2004); *Balt. Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 105–06 (1983); *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976).

factors and articulated a rational connection between the facts found and the choice made.”⁸⁸

The United States pioneered inclusive federal legislation that could enhance informed decision-making. The National Environmental Policy Act, the Freedom of Information Act, the Administrative Procedure Act, and the Toxic Release Inventory provide a framework for transparent, inclusive governance.⁸⁹ This US approach remains nascent, and this Article offers a comparative legal analysis with which to optimize inclusive environmental decision-making among state and non-state actors.

II. EPA STUDY ON HYDRAULIC FRACTURING AND WATER

Congress has directed the EPA to examine the relationship between hydraulic fracturing and drinking water resources.⁹⁰ Congress approved \$1.9 million for the EPA to re-open its 2004 hydraulic fracturing study, using independent sources of information, best available science, and a transparent peer-reviewed process.⁹¹ The EPA is researching all stages of the hydraulic fracturing water lifecycle, based on case studies and generalized scenario evaluations.⁹² The EPA anticipates releasing an interim report in 2012 and a final report in 2014.⁹³

⁸⁸ *Balt. Gas & Elec. Co.*, 462 U.S. at 105 (internal citations omitted).

⁸⁹ See Nolon, *supra* note 57, at 355; see also Lisa Blomgren Bingham, *Collaborative Governance: Emerging Practices and the Incomplete Legal Framework for Public and Stakeholder Voice*, J. DISP. RESOL. 269, 273–77 (2009) (discussing the scope of Freeman’s term “Collaborative Governance,” ranging from negotiated rulemaking to broader collaborative participatory planning, negotiation, and mediation).

⁹⁰ EPA DRAFT STUDY PLAN, *supra* note 8, at 1; see also ENVTL. PROT. AGENCY, SCIENCE IN ACTION: BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS: HYDRAULIC FRACTURING RESEARCH STUDY 2 (2010), available at <http://www.epa.gov/safewater/uic/pdfs/hfresearchstudyfs.pdf> (“Potential risks to surface and underground sources of drinking water might occur at various points in the hydraulic fracturing process. The likelihood of those risks causing drinking water contamination will be evaluated during the EPA hydraulic fracturing study. Contaminants of concern to drinking water include fracturing fluid chemicals and degradation products and naturally occurring materials in the geologic formation (e.g. metals, radionuclides) that are mobilized and brought to the surface during the hydraulic fracturing process.”).

⁹¹ H.R. REP. NO. 111-316, at 109 (2010) (Conf. Rep.), available at <http://www.gpo.gov/fdsys/pkg/CRPT-111hrpt316/pdf/CRPT-111hrpt316.pdf>.

⁹² EPA DRAFT STUDY PLAN, *supra* note 8, at 50.

⁹³ *Id.* at 51. EPA’s promised wastewater treatment standards for flowback will not be in place until 2014 at the earliest. See Press Release, Env’tl. Prot. Agency, EPA Announces Schedule to Develop Natural Gas Wastewater Standards/Announcement Is Part of Administration’s Priority to Ensure Natural Gas Development Continues Safely and Responsibly (Oct. 20, 2011), available at <http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceac8525735900400c27/91e7fad4b114c4a8525792f00542001!OpenDocument> [hereinafter Schedule to Develop].

A. *EPA Efforts to Enhance Public Participation*

To its credit, the EPA has committed to involving stakeholders and working with independent experts. Federal, state, and tribal partner consultations have focused on the study's scope, gaps in information, and ways to share data and conduct joint studies.⁹⁴ The EPA also held a series of sector-specific webinars, which were online, real-time, interactive forums that allowed participants to ask questions.⁹⁵ These forums have brought the EPA together with representatives from industry and non-governmental organizations to work on effective public engagement and information sharing.⁹⁶

Hydrofracking impacts on drinking water have galvanized strong responses by the general public to date. Thousands of people are participating in informational meetings where the EPA has solicited answers to fill EPA information gaps and set priorities.⁹⁷

While its transdisciplinary process to integrate analysis from inside and outside the EPA has taken a narrow slice of the unconventional natural gas picture, the EPA is seeking to address environmental justice.⁹⁸ The EPA notes that:

[t]here are concerns that hydraulic fracturing may adversely affect some communities that may be more likely to be exposed to harmful chemical contaminants as a result of fracturing activities, particularly through contaminated drinking water resources. Stakeholders have raised concerns about the environmental justice implications of gas drilling operations, noting that people with a lower socioeconomic status may be more likely to consent to drilling arrangements because they may not have the resources to engage with policymakers and agencies to affect alternatives. Additionally, drilling agreements are between landowners and well operators, implying that tenants and neighbors may have little or no input in the decision-making process. To address these

⁹⁴ EPA DRAFT STUDY PLAN, *supra* note 8, at 3 (“The federal partners included the Bureau of Land Management, the U.S. Geological Survey (USGS), the U.S. Fish and Wildlife Service, the U.S. Forest Service, the U.S. Department of Energy (DOE), the U.S. Army Corps of Engineers (USACE), the National Park Service (NPS), and the Agency for Toxic Substances and Disease Registry.”).

⁹⁵ ENVTL. PROT. AGENCY, WHAT’S A WEBINAR?, <http://www.epa.gov/webtraining/what-sawebinar.html> (last visited Sept. 25, 2012).

⁹⁶ EPA DRAFT STUDY PLAN, *supra* note 8, at 3 (“Public information meetings were held between July and September, 2010, in Fort Worth, Texas; Denver, Colorado; Canonsburg, Pennsylvania; and Binghamton, New York.”).

⁹⁷ *Id.* at 3–4.

⁹⁸ *Id.* at 15, 49–50.

concerns, EPA will combine the data collected on the location of well sites within the United States with demographic information (e.g., income and race) to screen whether hydraulic fracturing disproportionately impacts some citizens and to identify areas for further study.⁹⁹

While studying health and environmental impacts should not take the place of effectively enforcing strict regulations, the EPA is providing a collaborative governance best practice by involving civil society in its evaluation of hydraulic fracturing impacts on drinking water. This is being done by strengthening the following two core environmental justice components: (1) access to information and (2) public participation.¹⁰⁰

B. *Substantive Limitations of Federal Natural Gas Oversight*

In 2010, the EPA published a list of publicly known chemicals used in hydrofracking.¹⁰¹ The EPA requested voluntary disclosures, yet the EPA admits that its list is incomplete with regard to the full list of chemicals as well as the concentrations and frequency of chemical use. The EPA favors the term “release” which it uses to refer to a leak, spill, or release.¹⁰² In early 2011, Congressmen Waxman brought to light that diesel, and thus benzene, had been used in hydrofracking operations in nineteen states from 2005 to 2009—heightening public outcry over the identity and toxicity of hydrofracking chemicals.¹⁰³ The Chairman of the Subcommittee on Energy and Environment, Henry Waxman, and Subcommittee Chairman, Edward Markey, requested information on fracturing chemicals from eight natural gas companies.¹⁰⁴ The companies were not forthright in responding to these congressional requests.¹⁰⁵

⁹⁹ *Id.* at 49–50 (“Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.”).

¹⁰⁰ Garrick B. Pursley & Hannah J. Wiseman, *Local Energy*, 60 EMORY L.J. 877, 931–32 (2011) (citing William W. Buzbee, *Asymmetrical Regulation: Risk, Preemption, and the Floor/Ceiling Distinction*, 82 N.Y.U. L. REV. 1547, 1565–66 (2007)); see also Ann E. Carlson, *Iterative Federalism and Climate Change*, 103 NW. U. L. REV. 1097, 1102–03 (2009); Kirsten Engel, *State and Local Climate Change Initiatives: What Is Motivating State and Local Governments to Address a Global Problem and What Does This Say About Federalism and Environmental Law?*, 38 URB. LAW. 1015, 1021 (2006).

¹⁰¹ EPA DRAFT STUDY PLAN, *supra* note 8, at 25.

¹⁰² *See id.*

¹⁰³ *See id.*

¹⁰⁴ Press Release, Comm. on Energy & Commerce, Energy & Commerce Committee Investigates Potential Impacts of Hydraulic Fracturing (Feb. 18, 2010), available at <http://democrats.energycommerce.house.gov/index.php?q=news/energy-commerce-committee-investigates-potential-impacts-of-hydraulic-fracturing>; see also Letter from Rep. Henry A. Waxman, Chairman, Comm. on Energy and Commerce, to Ten Oil and Gas Companies (July 19, 2010), available at <http://democrats.energycommerce.house.gov/documents/20100719/Letters.Hydraulic.Fracturing.07.19.2010.pdf> [hereinafter Letter from Waxman].

¹⁰⁵ *See* Letter from Waxman, *supra* note 104.

Given the following EPA identified risks associated with hydrofracking, the scope and timeframe of the EPA study warrant serious criticism:

[I]arge hydraulic fracturing operations require extensive quantities of supplies, equipment, water, and vehicles, which could create risks of accidental releases, such as spills or leaks. Surface spills or releases can occur as a result of tank ruptures, equipment or surface impoundment failures, overfills, vandalism, accidents, ground fires, or improper operations. Released fluids might flow into a nearby surface water body or infiltrate into the soil and near-surface ground water, potentially reaching drinking water aquifers¹⁰⁶

The year 2014 is too distant a timeframe for the EPA to determine the “toxic and human health effects associated with hydraulic fracturing fluid chemical additives.”¹⁰⁷ Further, to depend on voluntary disclosures from hydraulic fracturing companies and scientific literature reviews of surface chemical spills does not strike this author as sensible given the option to require toxic disclosures and enforce robust environmental laws.

The EPA study does not primarily focus on air pollution from unconventional natural gas extraction, forgoing the opportunity to better understand the greenhouse gas emissions and other air quality impacts of ramping up drilling. Yet, the EPA recognizes that one of the most substantial pollution concerns with regard to hydrofracking is “off-gassing of methane from flowback before [a] well is put into production. The NYS DSGEIS estimated that 10,200 mcf of methane is off gassed per well.¹⁰⁸ Furthermore, the EPA highlights known reduced emissions completion methods that can prevent ninety percent of the methane from being released into the atmosphere and further destabilizing the climate.¹⁰⁹ At a local level, such methane concentrations can and do cause explosions, and volatile organic compounds (VOCs) emitted from unconventional natural gas extraction include benzene and other carcinogens.¹¹⁰ While the EPA’s September 2012 final rule to amend new source performance standards for petroleum refinery process heaters and flaring systems will induce refineries to capture the \$79 million predicted

¹⁰⁶ EPA DRAFT STUDY PLAN, *supra* note 8, at 25.

¹⁰⁷ *See id.* at 53.

¹⁰⁸ *Id.* at 55.

¹⁰⁹ *See id.*

¹¹⁰ *See id.* at 36, 55.

savings,¹¹¹ information is lacking on the scope of this rule for natural gas extraction generally, and on air pollution factors as straightforward as transport exhaust from heavy-duty diesel trucks. The National Park Service projects that truck traffic throughout the Marcellus Shale will substantially elevate nitrogen oxides levels.¹¹² The scope and timeframe of the EPA study does not appear to be in keeping with the precautionary principle given the continued use of the drinking water supplies in question by the general public in the meantime.¹¹³ The public sector appears to be taking civil society through an experiment with the hopes that natural gas revenue will offset adverse health and environmental integrity.¹¹⁴ It strikes this author as an inadequate scope to focus narrowly on hydraulic fracturing and drinking water rather than the broader array of adverse impacts that result from natural gas development.

Hydrofracking became economical by carving out responsibility for such negative externalities as water pollution. Other factors include rising fossil fuel prices as well as technological advances in drilling horizontally using high-pressure hydraulic fracturing. The oil and gas industry successfully lobbied for exemptions for hydrofracking from several major federal environmental laws, many of which went into effect with the enactment of the Energy Policy Act of 2005 (EPAAct).¹¹⁵ EPAAct exempted many activities associated with hydraulic fracturing from existing federal governance. In particular, industry lobbying succeeded in removing hydraulic fracturing from federal drinking water measures.¹¹⁶ This has come to be known as the EPAAct “Halliburton Loophole” to the

¹¹¹ See Standards of Performance for Petroleum Refineries; Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007, 77 Fed. Reg. 56,422, 56,425 (Sept. 12, 2012) (to be codified at 40 C.F.R. pts. 9, 60), available at <http://www.gpo.gov/fdsys/pkg/FR-2012-09-12/pdf/2012-20866.pdf>.

¹¹² EPA DRAFT STUDY PLAN, *supra* note 8, at 55.

¹¹³ See Elisabeth Rosenthal, *I Disclose . . . Nothing*, N.Y. TIMES, Jan. 21, 2012, at SR1, available at <http://www.nytimes.com/2012/01/22/sunday-review/hard-truths-about-disclosure.html?scp=1&sq=elizabeth%20rosenthal&st=cse> (noting that, “[i]f recent history serves as a guide, disclosure laws—meant to elucidate—do not necessarily lead to greater transparency or prevent the things they were meant to deter. Every holder of a subprime mortgage that is now underwater once signed an elaborate disclosure statement required by the Truth in Lending Act describing precisely the risky terms of their loan. Likewise, ‘super PACs’ in the presidential campaign are technically compliant with financial disclosure laws, but have so far proved successful at hiding many of the sources of their money.”).

¹¹⁴ See, e.g., *Jeffrey v. Ryan*, No. CA2012-001254 (N.Y. Sup. Ct. Oct. 2, 2012) (finding no dire need since the New York State Department of Environmental Conservation has yet to publish new regulations); see also Gerald B. Silverman, *New York State Court Strikes Down Local Law Banning Hydraulic Fracking*, BNA, Oct. 3, 2012, http://news.bna.com/deln/DELNWB/split_display.adp?fedfid=28322846&vname=dennotallissues&jd=a0d4x8k9e4&split=0 (“New York court rules that Binghamton’s temporary ban on fracking was not a properly enacted moratorium.”).

¹¹⁵ See Energy Policy Act of 2005 § 318, codified at 42 U.S.C. § 15801 (2005).

¹¹⁶ See *id* § 322, codified at 42 U.S.C. § 15801.

Safe Drinking Water Act (SDWA).¹¹⁷ Oil and gas drilling activities were generally exempt from the Clean Air Act (CAA);¹¹⁸ Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as “Superfund”);¹¹⁹ and Resource Conservation and Recovery Act.¹²⁰ These statutes may still cover aspects of oil and gas processing.¹²¹ Hannah Wiseman has discussed the manner in which Congress has exempted many hydraulic fracturing activities from federal provisions.¹²² Fragmented federal provisions still address limited unconventional natural gas development under such statutes as the CWA, SDWA, NEPA, Endangered Species Act (ESA),¹²³ Clean Air Act, Emergency Planning and Community Right to Know Act (EPCRA),¹²⁴ and CERCLA.

In the vacuum of federal governance, jurisdictions and stakeholders have brought suits against one another to act or refrain from acting to regulate unconventional natural gas extraction.¹²⁵ Hydraulic fracturing bans passed by local communities are being challenged by states on preemption grounds.¹²⁶ The New York Attorney General’s National Envi-

¹¹⁷ See 42 U.S.C. § 300(f) et seq. (2010).

¹¹⁸ See 42 U.S.C. § 7401 et seq. (1977).

¹¹⁹ See 42 U.S.C. § 9601 et seq. (2010).

¹²⁰ See 42 U.S.C. § 6901 et seq.

¹²¹ ENVTL. PROT. AGENCY, REGULATION OF OIL AND GAS CONSTRUCTION ACTIVITIES, <http://cfpub.epa.gov/npdes/stormwater/oilgas.cfm> (last visited Sept. 25, 2012).

¹²² See Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need To Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115, 117 (2009) (noting that “Congress’ exemption of fracing [sic] from the Safe Drinking Water Act involved two types of regulatory failure”); Hannah Wiseman, *Regulatory Adaptation in Fractured Appalachia*, 21 VILL. ENVTL. L.J. 229, 250–51 n.125 (2010) (listing and explaining exceptions); see also Emily C. Powers, *Fracking and Federalism: Support for an Adaptive Approach that Avoids the Tragedy of the Regulatory Commons*, 19 J.L. & POL’Y 913, 938–39 (2011) (citing Energy Policy Act of 2005, 42 U.S.C. § 15801 (2005) (exempting hydraulic fracturing processes from the Safe Drinking Water Act, 42 U.S.C. § 300(f) et seq. (2010))). The EPAAct also altered how portions of the following Acts are applied to hydrofracking, resulting in de facto exemptions: Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9601 et seq. (2010); Clean Water Act, 33 U.S.C. § 1251 et seq. (2010); National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 et seq. (2010); Clean Air Act of 1977, 42 U.S.C. § 7401 et seq. (1977); Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. § 11004 et seq. (2010).

¹²³ See 16 U.S.C. § 1531 et seq. (2011).

¹²⁴ 42 U.S.C. §§ 11004–49.

¹²⁵ See generally ARNOLD & PORTER LLP, HYDRAULIC FRACTURING CASE CHART (2012), available at <http://www.arnoldporter.com/resources/documents/Hydraulic%20Fracturing%20Case%20Chart.pdf>.

¹²⁶ See, e.g., *Ne. Natural Energy, LLC v. Morgantown*, No. 11-C-411, 2011 WL 3584376, at *7–8 (W. Va. Cir. Ct. 2011) (the Monongalia County Circuit Court rejected Morgantown, WV City Council’s home rule argument for passing an ordinance banning hydraulic fracturing, stating “[t]he doctrine of preemption is applicable law when the State has assumed control of a particular subject of regulation, and a local government has enacted an ordinance in the same field”); see also Marie C. Baca, *Pittsburgh Bans Natural Gas Drilling*, PROPUBLICA (Nov. 16, 2010, 4:49 PM), <http://www.propublica.org/article/pittsburgh-bans-natural-gas>

ronmental Policy Act case requesting an environmental impact assessment was dismissed on the grounds that proposed regulations, rather than final regulations, were premature and thus insufficient to establish a likelihood of injury.¹²⁷ The New York Attorney General and Riverkeeper Network sued the federal government, including the EPA,¹²⁸ to conduct an environmental impact assessment pursuant to NEPA¹²⁹ and may do so again if the Delaware River Basin Commission (DRBC) finalizes natural gas regulations. Just as unprecedented civil society protests led to a delay in the DRBC decision, New York has similarly extended its review based on a groundswell by civil society—the New York State Health Commissioner was tasked with reviewing the Department of Environmental Conservation’s health impact analysis and “identify the most qualified outside experts to advise him in his re-

drilling (Pittsburgh City Council based its ban on hydraulic fracturing on “health, safety and welfare of residents and neighborhoods within the city”); John M. Smith, *The Prodigal Son Returns: Oil and Gas Drillers Return to Pennsylvania with a Vengeance*, 49 DUQ. L. REV. 1, 33 (2011) (observing that Pennsylvania has better oversight of swimming pool fencing than hydrofracking fluid fencing and noting that, “so long as Pennsylvania state law continues to underserve its citizens by employing inadequate setbacks and oversight, municipalities may have little choice but to restrict zoning districts in order to protect schools, residential areas or other districts essential to public health and safety. Accordingly, the courts should find that this effort is a valid exercise of the police powers conferred to local municipalities.”); Patrick Duprey, *City Bans Hydraulic Fracturing*, THE ITHACAN (Nov. 3, 2011, 12:03 PM), <http://theithacan.org/17555/> (noting the Dryden, Ithaca, and Syracuse hydraulic fracturing bans).

¹²⁷ *N.Y. v. U.S. Army Corps of Eng’rs*, No. 11-CV-2599, 11-CV-3857, 11-CV-3780, 2012 U.S. App. WL 4336701, at *11–12 (E.D.N.Y. 2012). On Sept. 24, 2012, a New York federal court dismissed as premature three lawsuits requesting federal agencies to conduct an environmental impact study on the Delaware River Basin Commission’s natural gas regulations since the regulations had been delayed; the three lawsuits filed in the U.S. District Court for the Eastern District of New York by New York State, Damascus Citizens for Sustainability, Inc., and the Delaware Riverkeeper Network were consolidated for pretrial purposes. *See id.*; *see also* Lorraine McCarthy, *Court Dismisses Lawsuits Over Draft Rules for Delaware River Basin Gas Extraction*, BNA, Sept. 28, 2012, http://news.bna.com/erln/ERLNBW/split_display.adp?fedfid=28117548&vname=ernotallissues&jd=a0d4u7j8e1&split=0.

¹²⁸ *See* Complaint at 1, *N.Y. v. U.S. Army Corps of Eng’rs*, No. 11-CV-2599, 11-CV-3857, 11-CV-3780, 2012 U.S. App. WL 4336701 (E.D.N.Y. Sept. 24, 2012) (No. 11-CV-2599); *see also* *N.Y. v. U.S. Army Corps of Eng’rs* (The federal judge in Brooklyn dismissed the environmental suit, without prejudice, against the Delaware River Basin Commission challenging the draft rules for lack of ripeness given the DRBC delay in issuing hydraulic fracturing regulations. This leaves the door wide open for New York State and the River Keeper Network to return to court if and when the DRBC goes forward with regulating hydraulic fracturing. The decision also dismissed the sovereign immunity argument and provided dicta on the dangers of natural gas extraction.).

¹²⁹ *See* 42 U.S.C. § 4321 et seq. (2010).

view,”¹³⁰ and then the DEC announced that it would re-initiate its rule-making process and conduct another public hearing.¹³¹

In the meantime, the EPA has challenged the environmental impact statement issued by the New York Department of Conservation. As federal-state responsibilities remain in limbo, subject to the manner in which arguments play out in the judicial system, ordinary citizens have organized protests that have resulted in delaying a decision on whether to hydraulically fracture in the Delaware River Basin. The drinking water for approximately eight million people in New York City¹³² faces regulatory indecision amidst ongoing hydraulic fracturing debate among civil society, local governments, states, the federal government, courts, and a trans-boundary water commission.

New York Attorney General Schneiderman’s commitment to the federal environmental impact assessment under NEPA prior to Delaware River Basin natural gas permitting is at odds with the New York Department of Environmental Conservation Revised Draft Supplemental Generic Environmental Impact Statement (RDSGEIS).¹³³ The RDSGEIS, which in turn takes a strikingly different tone than the EPA Region 2 comments, provides over twenty-five pages of substantive recommendations for strengthening New York’s environmental impact assessment. This is an intriguing legal dynamic in which New York is providing a check-and-balance role within the DRBC by insisting on NEPA review and a full environmental impact statement for the DRBC while the EPA, a named defendant in the New York suit, is in turn greatly enhancing access to information and transparency by submitting deeply critical

¹³⁰ Gerald B. Silverman, *State Delays Fracking Regulations in Order to Conduct Public Health Review*, BNA, Sept. 28, 2012, http://news.bna.com/erln/ERLNWB/split_display.adp?fedfid=28117507&vname=ernotallissues&jd=a0d4t4b2p8&split=0 (“New York’s environmental conservation commissioner announced Sept. 20 that the state’s proposed rules for hydraulic fracturing will be delayed for an indeterminate length of time so a public health review can be conducted by the state Department of Health.”).

¹³¹ Danny Hakim, *Shift by Cuomo on Gas Drilling Prompts Both Anger and Praise*, N.Y. TIMES, Oct. 1, 2012, at A1, available at <http://www.nytimes.com/2012/10/01/nyregion/with-new-delays-a-growing-sense-that-gov-andrew-cuomo-will-not-approve-gas-drilling.html?ref=todayspaper>.

¹³² “The Delaware Aqueduct—an 85-mile water tunnel [] conveys approximately half of the drinking water from four upstate reservoirs to more than eight million people in New York City, and one million people in Ulster, Orange, Putnam, and Westchester counties.” Press Release, NYC Dep’t of Env’tl. Prot. Comm’n & Intergovernmental Affairs, DEP Begins Study of New Method to Seal Cracks in Delaware Aqueduct (Sept. 5, 2012), available at http://www.nyc.gov/html/dep/html/press_releases/12-61pr.shtml.

¹³³ See N.Y. DEP’T. ENVTL. CONSERVATION, REVISED DRAFT: SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM: WELL PERMIT ISSUANCE FOR HORIZONTAL DRILLING AND HIGH-VOLUME HYDRAULIC FRACTURING TO DEVELOP THE MARCELLUS SHALE AND OTHER LOW-PERMEABILITY GAS RESERVOIRS 3–4 (2011), available at <http://www.dec.ny.gov/data/dmn/rdsgeisfull0911.pdf> [hereinafter NEW YORK RDSGEIS].

comments of New York's RDSGEIS. On the one hand, this may well be federalism at its most effective because litigation certainly brings otherwise unavailable information into the public domain. On the other hand, it is not cooperative federalism. Yet collaborative governance is occurring quietly here and there. This author has presented at conferences in which EPA officials and their state counterparts have shared ideas in good faith and, together with other experts and members of the audience, analyzed solutions. Michael Gerard's hosting of a Region 2 EPA meeting at Columbia Law School, Cornell Law students' hosting of an interdisciplinary three-day conference on natural gas, and James Van Nostrand's inaugural West Virginia Climate and Energy Center's hydrofracking forum, demonstrate the non-litigious approach to cooperative governance. Universities have hosted forums from Brooklyn to Buffalo and beyond.

The stakes could not be much higher, and sentiments are running in the high-octane range. Yet, many sensible recommendations are emerging and a middle-ground is being forged. Non-state actors have been a driving force in this process. In addition to academia, non-governmental organizations ranging from the Natural Resources Defense Council (NRDC) to Riverkeeper have successfully brought detailed technical information into the public domain through independent research and exercising rights to justice through citizen suits that have brought disclosures into the public record. These efforts have enhanced the accuracy of information available to the general public. The tripartite system of checks and balances is slowly unfolding. A more effective approach, however, would be genuine cooperative federalism and inclusive decision-making. Informed, inclusive decision-making on natural gas extraction is well within the capacity of New York State, the DRBC, the federal government, and the general public.

III. THE DELAWARE RIVER BASIN COMMISSION: REGIONAL ENERGY-WATER-CLIMATE DECISION-MAKING

Exxon Mobil's exploration application to the Delaware River Basin Commission remains pending as the judiciary determines whether the DRBC is required to conduct a NEPA environmental impact assessment before issuing hydraulic fracturing permits.¹³⁴ Fifteen million people depend upon DRBC water,¹³⁵ as does the 13,539 square-mile Delaware

¹³⁴ Tiffany Kary, *U.S. Can Try to End New York Fracking Lawsuit, Judge Rules*, BLOOMBERG BUSINESSWEEK, Aug. 10, 2011, <http://www.businessweek.com/news/2011-08-10/u-s-can-try-to-end-new-york-fracking-lawsuit-judge-rules.html>.

¹³⁵ DEL. RIVER BASIN COMM'N, BASIN INFO., <http://www.state.nj.us/drbc/basin/> (last visited Oct. 10, 2012) ("Over 15 million people (approximately five percent of the nation's population) rely on the waters of the Delaware River Basin for drinking, agricultural, and industrial

River Basin ecosystem.¹³⁶ New York sued the federal government¹³⁷ to compel NEPA environmental impact assessment and public review before the Delaware River Basin Commission's proposed regulations for hydraulic fracturing could go into effect.¹³⁸ The Delaware Riverkeeper brought a similar case.¹³⁹

New York argued that hydraulic fracturing poses “‘an unacceptable threat to the unfiltered, fresh water supply of nine million New Yorkers’”¹⁴⁰ The Fish and Wildlife Service and National Park Service, two of the ten federal agencies sued by New York, supported the New York position and encouraged the federal government to conduct an environmental impact assessment of hydraulic fracturing.¹⁴¹ The New York suit against the federal government withstood the federal argument that it has sovereign immunity and may not be sued unless it has waived its immunity or has consented to the suit.¹⁴² Substantively and procedurally, making water governance decisions at the watershed level can optimize transboundary cooperative federalism. Does this approach extend to procedural and substantive natural gas decision-making as well?

In 1961, Delaware, New Jersey, New York, Pennsylvania, and a representative from the federal government entered into the Delaware River Basin Compact¹⁴³ to regionally protect and manage the Delaware River Basin. They established the Delaware River Basin Commission¹⁴⁴ to coordinate regional management of the basin. The DRBC is a federal-interstate compact government agency.¹⁴⁵ This regional legal entity came into being in 1961 when President Kennedy and the governors of Delaware, New Jersey, Pennsylvania, and New York signed concurrent compact legislation.¹⁴⁶ Delaware River Basin Commission Meetings

use, but the watershed drains only four-tenths of one percent of the total continental U.S. land area.”).

¹³⁶ See Press Release, The Del. River Basin Comm'n (DRBC), DRBC Postpones November 21 Special Meeting: New Meeting Date Still to be Determined (Nov. 18, 2011), http://www.nj.gov/drbc/home/newsroom/news/approved/20111118_newsrel_naturalgas.html.

¹³⁷ Complaint at 1, *N.Y. v. U.S. Army Corps of Eng'rs*, No. 11-CV-2599, 11-CV-3857, 11-CV-3780, 2012 U.S. App. WL 4336701 (E.D.N.Y. Sept. 24, 2012) (No. 11-CV-2599).

¹³⁸ See 42 U.S.C. 4321 et seq. (2010).

¹³⁹ Complaint at 1, *Del. Riverkeeper Network v. U.S. Army Corps of Eng'rs*, (No. 11-CV-3780), available at <http://www.delawariverkeeper.org/resources/Comments/FrackingComplaint.pdf>.

¹⁴⁰ Complaint at 3, *N.Y. v. U.S. Army Corps of Eng'rs*, (No. 11-CV-2599).

¹⁴¹ Kary, *supra* note 134.

¹⁴² See *Gray v. Bell*, 712 F.2d 490, 507 (D.C. Cir. 1983).

¹⁴³ See Delaware River Basin Compact, Pub. L. No. 87-328, 75 Stat. 688 (1961), available at <http://www.state.nj.us/drbc/regs/compa.pdf>.

¹⁴⁴ See *id.*

¹⁴⁵ DEL. RIVER BASIN COMM'N, NATURAL GAS DRILLING INDEX PAGE, <http://www.nj.gov/drbc/programs/natural> (last visited Sept. 26, 2012).

¹⁴⁶ DEL. RIVER BASIN COMM'N, ABOUT DRBC, <http://www.nj.gov/drbc/about/> (last visited Sept. 26, 2012).

gather four state commissioners as well as the North Atlantic Division Engineer of the U.S. Army Corps of Engineers as the federal representative.¹⁴⁷ Before the DRBC, coordination was difficult among over seventy-five federal, interstate, and state agencies with mandates covering disparate and overlapping aspects of watershed management along the 330 miles of the Delaware River.¹⁴⁸ Now, each DRBC commissioner holds a vote of equal sway, and a majority vote resolves most decisions; budget and drought declarations require unanimous votes.¹⁴⁹

Business meetings, hearings, and advisory committees are open to the public.¹⁵⁰ This public participation combined with regional management provides a model for good governance. The DRBC basin-wide comprehensive water management plan, combined with its water resources program that coordinates quality and quantity needs among basin stakeholders¹⁵¹ makes the DRBC flexible enough to carry out adaptive management in the face of evolving scientific water-energy-climate understanding.¹⁵² Importantly, the DRBC can both allocate water and conduct, sponsor, and share research to enhance its adaptive governance capacity.¹⁵³

Each Compact Signatory State has committed to promulgating adequate water governance legislation.¹⁵⁴ Yet unconventional natural gas extraction challenges water conservation and ecosystem integrity commitments. The Compact does not allow projects that “substantially impair or conflict with [the comprehensive] plan.”¹⁵⁵ Furthermore, the Compact encourages Commission water governance that safeguards “public health, stream quality control, economic development, improvement of fisheries, recreation, dilution and abatement of pollution, [and]

¹⁴⁷ *Id.*

¹⁴⁸ *See id.* (explaining that the Delaware River runs from Hancock, New York to the Delaware Bay).

¹⁴⁹ *Id.* (“Commission programs include water quality protection, water supply allocation, regulatory review (permitting), water conservation initiatives, watershed planning, drought management, flood loss reduction, and recreation. The DRBC is funded by the signatory parties, project review fees, water use charges, and fines, as well as federal, state, and private grants.”).

¹⁵⁰ *Id.*

¹⁵¹ *See* Delaware River Basin Compact, Pub. L. No. 87-328, 75 Stat. 688, art. III, § 3.2(a)–(b) (1961) available at <http://www.state.nj.us/drbc/regs/compa.pdf>.

¹⁵² *See generally* William W. Buzbee, *Contextual Environmental Federalism*, 14 N.Y.U. ENVTL. L.J. 108 (2005) (discussing environmental federalism and overlapping regulatory capacity); *see also* David E. Adelman & Kirsten H. Engel, *Adaptive Federalism: The Case Against Reallocating Environmental Regulatory Authority*, 92 MINN. L. REV. 1796 (2008).

¹⁵³ Noah D. Hall, *Interstate Water Compacts and Climate Change Adaptation*, 5 ENVTL. & ENERGY L. & POL’Y J. 237, 289 (2010). Furthermore, “[a]pproximately 5% of the United States’ population (almost fifteen million people) relies on the river for domestic and industrial use.” *Id.* at 288. *See generally* Delaware River Basin Compact, art. III, § 3.6(c).

¹⁵⁴ *See* Delaware River Basin Compact, art. III; Hall, *supra* note 153, at 289–90.

¹⁵⁵ Delaware River Basin Compact, art. III, § 3.8.

the prevention of undue salinity”¹⁵⁶ The Delaware River Basin encompasses special protection waters, further enhancing watershed protection.¹⁵⁷ According to Noah Hall, the Delaware River Basin Compact is

in many ways a model compact for adapting to the risks and uncertainties of climate change. It provides comprehensive planning and enforcement, rigorous water conservation, and an ecosystem protection regime. Most importantly, the Delaware River Basin Commission has the legal authority and resources to address new circumstances and stresses without severely disrupting water uses and rights.¹⁵⁸

The Commission can control surface and groundwater withdrawals¹⁵⁹ and bring legal action against any entity in violation of the Compact’s provisions pursuant to the Compact.¹⁶⁰ Yet, in the context of unconventional natural gas extraction, it is striking that only New York State has challenged the actions of the Commission with regard to water governance.

Over thirty percent of the Delaware River Basin lies over the Marcellus Shale formation.¹⁶¹ This area is inhabited by five million people.¹⁶² New York City Mayor Michael Bloomberg explained that, “[b]ecause full-scale development of natural gas exploitation in the watershed could degrade water quality, a rush to regulate and drill risks the long-term viability of one of the most important drinking water sources in the United States.”¹⁶³ As a tight geologic formation, Marcellus Shale

¹⁵⁶ *Id.* art. IV, § 4.2(a); *see also* Hall, *supra* note 153, at 289 (“The Commission can also sponsor any soil conservation, forestry, or fish and wildlife project that is related to the water resources of the basin.”) (citing Delaware River Basin Compact, art. VII); *see generally* Delaware River Basin Compact, art. VII.

¹⁵⁷ *See* Kevin J. Garber et al., *Water Sourcing and Wastewater Disposal: Two of the Least Worrisome Aspects of Marcellus Shale Development in Pennsylvania*, 13 DUQ. BUS. L.J. 169, 176 (2011).

¹⁵⁸ Hall, *supra* note 153, at 290.

¹⁵⁹ Delaware River Basin Compact, art. X, § 10.1.

¹⁶⁰ *Id.* art. V, § 5.4.

¹⁶¹ Brigid R. Landy & Michael B. Reese, *Getting to “Yes”: A Proposal for a Statutory Approach to Compulsory Pooling in Pennsylvania*, 41 ENVTL. L. REP. 11044, 11044, 11047 (2011) (noting that, “as rock oil began to replace whale oil as the dominant source of fuel for illumination, supply often exceeded demand”); *see generally* U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2011 WITH PROJECTIONS TO 2035 EARLY RELEASE REPORT 1 (2010), available at <http://www.eia.gov/oiarf/aeo/gas.html>.

¹⁶² Landy & Reese, *supra* note 161, at 11047 (2011).

¹⁶³ STATE OF DELAWARE, MARKELL: “FRACKING” PROPOSAL CURRENTLY LACKS SUFFICIENT HEALTH AND SAFETY PROTECTIONS, http://news.delaware.gov/2011/11/17/drbc_fracking/ (last visited Sept. 26, 2012) (describing the needed “close coordination” of the following regulatory regimes: the state and local governments of Pennsylvania and New York, coupled with the Federal Environmental Protection Agency and the Commission. Some of

natural gas deposits have not been seen as recoverable until recent use of technological advances in hydraulic fracturing increased costs of extracting conventional energy and exemptions to federal environmental laws.¹⁶⁴

In 2009, the DRBC required approval for the commencement of all natural gas extraction within the basin's Special Protection Waters given the significant impact that unconventional natural gas production can have on the basin's surface and groundwater quality and quantity.¹⁶⁵ The DRBC found that as a result of "water withdrawals, wastewater disposal, and other activities, natural gas extraction projects in shale formations may individually or cumulatively affect the water quality of Special Protection Waters by altering their physical, biological, chemical or hydrological characteristics."¹⁶⁶ The DRBC further clarified that this determination included all natural gas extraction drilling pads, related activities/facilities, and all water withdrawals used.¹⁶⁷

In 2010, the DRBC issued draft regulations for hydraulic fracturing and scheduled a final vote for November 2011. A large civil society demonstration was planned for the November 21 meeting to express the broad view that the draft rules do not adequately protect drinking water supplies.¹⁶⁸ New York and Delaware favored a meeting postponement, while Pennsylvania and New Jersey were likely to approve the draft regulations, so the federal government held the deciding vote as to whether to approve the regulations.¹⁶⁹ The DRBC, however, postponed its November 21, 2011 meeting, leaving the five commission-members addi-

these regulatory schemes have (1) yet to be finalized; (2) have just been finalized but not fully evaluated; or (3) are final but inadequate.).

¹⁶⁴ Landy & Reese, *supra* note 161, at 11046–49.

¹⁶⁵ See Garber et al., *supra* note 157, at 179–80. The DRBC Executive Director issued a determination under 18 C.F.R. § 401.35(a) that DRBC review is to remain consistent with the Delaware River Basin Comprehensive Plan, largely found in the DRBC Water Code. See *id.* Furthermore, in December 2010, the DRBC proposed a new Article 7 of its Water Quality Regulation to protect the basin's water resources during construction and operation of natural gas development projects. *Id.* at 180. The proposed Article 7 applies to water withdrawal, well pad infrastructure, and wastewaters. *Id.*

¹⁶⁶ Press Release, Del. River Basin Comm'n, DRBC Eliminates Review Thresholds for Gas Extraction Projects in Shale Formations in Delaware Basin's Special Protection Waters (May 2009), available at <http://www.state.nj.us/drbc/programs/natural/archives.html#2>.

¹⁶⁷ See *id.*

¹⁶⁸ STATEIMPACT PA., DELAWARE RIVER BASIN COMMISSION: BATTLEGROUND FOR GAS DRILLING, <http://stateimpact.npr.org/pennsylvania/tag/drbc/> (last visited Sept. 26, 2012) ("The DRBC is funded by the states, the federal government, permit fees, fines, as well as public and private grants. The Delaware River is the longest free-flowing river east of the Mississippi with its headwaters located in Hancock, N.Y. It stretches 330 miles and empties into the Delaware Bay. The Delaware River provides drinking water to about 15 million people in New York, New Jersey, Pennsylvania and Delaware. In 1968 the Delaware River was declared a 'Wild and Scenic River' by President Lyndon Johnson, which affords it special protection. Parts of the river have also received the designation of 'special protection waters.'").

¹⁶⁹ *Id.*

tional time for review of the draft natural gas regulations.¹⁷⁰ Delaware Governor Jack Markell's announcement that he would vote against the approval of unconventional natural gas extraction was crucial to the delayed vote.¹⁷¹

While expressing appreciation for fellow member states' interest in hydraulic fracturing jobs and tax revenue, Governor Markell explained that

[a]s a downstream state that could be adversely affected by poorly crafted and/or executed regulations, Delaware is focused on protecting the water quality throughout the Delaware River Basin. While this watershed only covers a small portion of the Marcellus Shale, it serves as the primary water supply source for at least two-thirds of Delaware's citizens.¹⁷²

Markell expressed "significant concerns" that the proposed extraction regulations would not protect the region's water supply.¹⁷³ While the DRBC's review of over 68,000 public comments¹⁷⁴ reflects the profound importance of the DRBC decision, the public needs to be able to review and comment upon significant revisions to the draft regulations.¹⁷⁵ The DRBC publically released the draft regulations on November 8 and made additional changes on November 16. Therefore holding the final judgment meeting on November 21st would be an inadequate window for public participation.¹⁷⁶

There are two separate discussions underway. The first discussion involves a decision regarding natural gas extraction, and the second discussion involves mitigating measures of such extraction. Because there is little information in the public domain, it is unclear if the second discussion warrants any attention. At best, attention to the second discussion would provide threshold best practices for "water withdrawal, siting and setback requirements, drilling and construction standards, ongoing operational protections, and clean up protocols and financial assurances should a release occur."¹⁷⁷

¹⁷⁰ See Press Release, Del. River Basin Comm'n, DRBC Postpones November 21 Special Meeting: New Meeting Date Still to Be Determined (Nov. 18, 2011), available at http://www.state.nj.us/drbc/home/newsroom/news/approved/20111118_newsrel_naturalgas.html.

¹⁷¹ See STATEIMPACT PA., *supra* note 168.

¹⁷² STATE OF DELAWARE, *supra* note 163.

¹⁷³ *Id.*

¹⁷⁴ See *id.*; see also DEL. RIVER BASIN COMM'N, COMMENTS ON DEC. 2010 DRAFT NATURAL GAS REGULATIONS, http://www.state.nj.us/drbc/programs/natural/draftregs-dec2010_comments.html (last visited Sept. 26, 2012).

¹⁷⁵ See STATE OF DELAWARE, *supra* note 163.

¹⁷⁶ See *id.*

¹⁷⁷ See *id.*

Unconventional natural gas drillers rapidly increased operations in rural Pennsylvania and drilled 3,000 wells in approximately three years.¹⁷⁸ Instead of conducting a thorough environmental assessment before commencing significant industrial activity in communities, the Marcellus Shale Advisory Commission of scientists and nongovernmental stakeholders has taken roughly four years to draft extraction recommendations.¹⁷⁹ “Irresponsible hydrofracturing” continues to occur in Pennsylvania, impacting public health and environmental integrity.¹⁸⁰ Pennsylvania’s legislative debate regarding scientific understanding of sound well construction and operation continues, as does New York’s review of cementing and well construction. As a result, the DRBC is not in a position to find state standards adequately protective of water supplies when state requirements are still a moving target or have yet to be promulgated.

IV. NEW YORK ENVIRONMENTAL IMPACT ASSESSMENT OF HYDRAULIC FRACTURING

New York public officials are conducting a high profile hydraulic fracturing review of economic benefits vis-à-vis adverse impacts to public health and environmental integrity. Public health and natural resource regulation have long been recognized as within state police power authority. Based upon this police power, New York has proposed unconventional natural gas regulations.¹⁸¹ Yet New York’s approach has a long way to go before representing analytical environmental impact assessment.

This Article has sketched the regulatory chaos regarding unconventional natural gas development and has analyzed the environmental justice implications of public sector gridlock. This section considers the communication that is occurring among federal, state, industry, health, and environmental stakeholders. Each have distinct constituents and therefore prefer different but overlapping regulations for unconventional natural gas extraction. This author seeks to take this communication, which is largely in the form of comments submitted to New York during

¹⁷⁸ *See id.*

¹⁷⁹ *See id.*

¹⁸⁰ *See id.*

¹⁸¹ *See* N.Y. ENVTL. CONSERV. LAW § 23-0301 (McKinney 2012). New York Environmental Conservation Law Article 23 grants DEC jurisdiction over oil and gas. *Id.* §§ 23-0303, 23-0305. The Department of Transportation and Public Service Commission regulate transport and siting of gas lines, respectively, without falling under the public participation provisions of New York’s counterpart to NEPA, namely the State Environmental Quality Review Act (SEQRA). N.Y. COMP. CODES R. & REGS. tit. 6, §§ 617.5(a), 617.5(c)(35) (2011); *see also* NEW YORK RDSGEIS, *supra* note 133, at 3–4; N.Y. DEP’T OF ENVTL. CONSERV., MARCELLUS SHALE, <http://www.dec.ny.gov/energy/46288.html> (last visited Sept. 26, 2012) (offering an overview of hydrofracking and New York’s regulatory plan).

its State Environmental Quality Review Act (SEQRA) required review,¹⁸² and conduct a legal analysis with which coordinated collaborative governance can emerge.

A. *EPA Substantive Recommendations to New York*

The EPA advised New York to strengthen its environmental impact analysis of radioactive flowback water before commencing hydraulic fracturing¹⁸³ and remove language that minimized radioactivity concerns. Subsequently, New York should enhance regulation language that adequately responds to elevated levels of radioactivity, generally, and concentrated exposure to naturally occurring radioactive materials (NORM) by water treatment plant workers, in particular.¹⁸⁴ New York should explain how proper handling of elevated concentrations of naturally occurring materials will occur when concentrations for technologically-enhanced naturally-occurring radioactive materials (TENORM) result from pipe scale or water treatment waste.¹⁸⁵ Radioactive water should not be sent to wastewater treatment plants that do not have the capacity to treat such water.¹⁸⁶ Similarly, New York should regulate disposal of radioactive drill cuttings that endanger human health and the environment at a permitted offsite facility.¹⁸⁷

EPA stated that “NYSDEC [New York State Department of Environmental Conservation] must ensure that updated flooding conditions are used for evaluating floodplain distances”¹⁸⁸ and requested that NYSDEC consider floodplain prohibitions for not only well pads but all natural gas infrastructures, including pipes, transfer stations, and containment tanks.¹⁸⁹ New York should require closed loop storage rather than surface impoundments and ensure adequate liability and regulatory funding for well, water, and related testing.¹⁹⁰ New York should assess adverse impacts of oil and gas infrastructure and related activities beyond narrowly focusing on hydraulic fracturing. The EPA advised broad regulation beyond narrow categories of slickwater or high volume hydraulic fracturing.¹⁹¹ The EPA advised New York to recognize the New York State Public Service Commission as a cooperating agency given its regu-

¹⁸² See N.Y. COMP. CODES R. & REGS. tit. 6, § 617.9(b)(5)(v) (2011).

¹⁸³ EPA COMMENTS, *supra* note 17, at 2.

¹⁸⁴ See *id.* at 4.

¹⁸⁵ See *id.* at 14.

¹⁸⁶ EPA’s promised wastewater treatment standards for flowback will not be in place until 2014 at the earliest. See Schedule to Develop, *supra* note 93.

¹⁸⁷ See EPA COMMENTS, *supra* note 17, at 2.

¹⁸⁸ *Id.* at 18; see also Elizabeth Burleson, *Energy Revolution and Disaster Response in the Face of Climate Change*, 22 VILL. ENVTL. L.J. 169 (2011).

¹⁸⁹ EPA COMMENTS, *supra* note 17, at 2.

¹⁹⁰ See *id.* at 1.

¹⁹¹ See *id.* at 2.

latory authority over natural gas gathering lines.¹⁹² With regard to water availability, New York should require permits to include reporting of proposed water sources.¹⁹³ The EPA advised using the New York State Department of Health Source Water Assessment Program Plan buffer zone of a one-mile radius around community and non-transient non-community wells.¹⁹⁴ Furthermore, this should be considered as a buffer radius with regard to any natural gas impact, not just well pad siting. The EPA advised New York to reference recent seismic risk zone studies and to regulate comprehensively to prevent seismic damage.¹⁹⁵ New York should map naturally occurring methane¹⁹⁶ and require cement bond logging or equivalent tests of shallow gas zones as well as areas affecting drinking water supplies.¹⁹⁷

New York should include all six principal greenhouse gas emissions, the relative lifespan of each greenhouse gas, and their global warming potential.¹⁹⁸ Further, New York should clarify direct versus indirect emissions and specify greenhouse gas emissions that result from unconventional natural gas development beyond the following: vented, combustion, and fugitive emissions; within vented emissions, special mention of “incomplete flare combustion” needs analysis given its substantial adverse contribution to climate change.¹⁹⁹ Other greenhouse gas emissions that need to be further analyzed include those that occur during transport, storage, and distribution, and those associated with downstream use.²⁰⁰

¹⁹² See *id.*

¹⁹³ See *id.*

¹⁹⁴ See *id.* at 3.

¹⁹⁵ See *id.*

¹⁹⁶ See *id.*

¹⁹⁷ See *id.* at 16.

¹⁹⁸ See *id.* at 12.

¹⁹⁹ See *id.* at 12; see also Elizabeth Burleson, *Emerging Human Rights and Environmental Law in the Context of Hydraulic Fracturing for Natural Gas*, __ CASE W. RES. L. REV. (forthcoming 2013). EPA has published a final rule to amend new source performance standards for petroleum refinery process heaters and flaring systems; net annual savings of \$79 million are predicted given the value of the gas captured. See Standards of Performance for Petroleum Refineries; Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007, 77 Fed. Reg. 56,422, 56,422, 56,425 (Sept. 12, 2012) (to be codified at 40 C.F.R. pts. 9, 60), available at <http://www.gpo.gov/fdsys/pkg/FR-2012-09-12/pdf/2012-20866.pdf>; ENVTL. PROT. AGENCY, OIL AND NATURAL GAS SECTOR: NEW SOURCE PERFORMANCE STANDARDS AND NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS REVIEWS (2012) (to be codified at 40 C.F.R. pt. 63), available at <http://www.epa.gov/airquality/oilandgas/pdfs/20120417finalrule.pdf> (This notice has been signed by Lisa P. Jackson, EPA Administrator, and has been submitted for publication in the *Federal Register*.); see also ENVTL. PROT. AGENCY, OVERVIEW OF FINAL AMENDMENTS TO AIR REGULATIONS FOR THE OIL AND NATURAL GAS INDUSTRY: FACT SHEET 1 (2012), available at <http://www.epa.gov/airquality/oilandgas/pdfs/20120417fs.pdf> [hereinafter FACT SHEET].

²⁰⁰ See EPA COMMENTS, *supra* note 17, at 12.

The EPA advised New York to prohibit the use of production brine in road-spreading,²⁰¹ noting that road-spreading of all natural gas related wastewater would need to meet Clean Air Act provisions.²⁰² New York should designate responsible regulatory authority for wastewater disposal as well as enhance baseline and post-development air and water monitoring.²⁰³ The EPA called for New York to quantify all volatile organic compounds released to the atmosphere and use state of the art vapor recovery systems.²⁰⁴

The EPA noted that the federal government has broader authority than described by the RDSGEIS:

Despite some of the restrictions legislated through the Energy Policy Act of 2005, EPA retains responsibilities for industry oversight under several Federal statutes, including the Clean Water Act, Clean Air Act, Safe Drinking Water Act, Comprehensive Environmental Response, Compensation, and Liability Act, Resource Conservation Recovery Act, Emergency Planning Community Right-to-Know Act and the National Environmental Policy Act. For example, EPA Region 2 has regulatory authorities concerning publicly-owned treatment works (POTWs) disposal of flowback and produced water.²⁰⁵

Furthermore, President Obama signed an Executive Order on April 13, 2012, creating a coordinating unconventional domestic natural gas development inter-agency working group that is likely to respond at an interstitial governance level.²⁰⁶

Finally, the EPA recommended that New York update regulations on permit provisions and that New York require disclosure of chemical concentrations as well as chemical names.²⁰⁷

²⁰¹ See *id.* at 23; see also Elizabeth Burleson, *Emerging Law Addressing Climate Change and Water*, 5 ENVTL. & ENERGY L. & POL'Y J. 489, 491–94 (2010) [hereinafter Burleson, *Emerging Law*] (noting the complexities of disposing of brine in the desalination context).

²⁰² See EPA COMMENTS, *supra* note 17, at 5–6.

²⁰³ See *id.* at 9 (noting that, “on August 23, 2011, the EPA published in the Federal Register the proposed rule, ‘Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Review.’ This rule is scheduled to be promulgated in March 2012 and may broaden the scope of operations and emission points covered by existing rules.”).

²⁰⁴ See *id.* at 10.

²⁰⁵ *Id.* at 21 (noting further that “an underground injection control permit under the Safe Drinking Water Act is required if diesel is used in the high-volume hydraulic fracturing fluid.”).

²⁰⁶ Exec. Order No. 13,605, 77 Fed. Reg. 23,107 (Apr. 13, 2012).

²⁰⁷ See EPA COMMENTS, *supra* note 17, at 19, 23.

B. Joint Legal Memorandum by Environmental Non-Profits

The widespread nature of unconventional natural gas extraction proposed across New York warrants the SEQRA required consideration of reasonable and feasible alternatives to the proposed action.²⁰⁸ Adding piecemeal permit conditions over outdated regulations invites compliance problems. The non-discretionary nature of regulations combined with formal public review makes regulations a far more transparent means of governance.²⁰⁹ Straightforward oil and gas regulations should be codified in the New York Codes, Rules and Regulations (N.Y.C.R.R.). New York should greatly expand upon its analysis of alternatives beyond its cryptic (1) No-Action Alternative, (2) Phased Permitting Approach, and (3) Green Categories. New York has failed to meet its statutory requirement to consider alternatives, given its paltry coverage in a 1,500-plus-page document.²¹⁰ Each of these should be meaningfully analyzed. New York should additionally consider the options of (1) waiting until the NYSDEC has regulatory capacity,²¹¹ (2) waiting until the EPA 2014 study results present feasible alternatives, (3) giving deference to local zoning, (4) designating environmental hazard areas off-limits to drilling, and (5) allowing unconventional natural gas drilling only at the demonstration project scale until further environmental impact analysis can be conducted.²¹²

New York's RDSGEIS neither references a plan for treatment of billions of gallons of toxic and radioactive wastewater nor provides an adequate environmental impact analysis of shipping, storing, and treating

²⁰⁸ See 6 N.Y.C.R.R. § 617.9(b)(5)(v) (1996).

²⁰⁹ See CATSKILL MOUNTAINKEEPER, DEL. RIVERKEEPER NETWORK, EARTHJUSTICE, THE NAT. RES. DEF. COUNCIL & RIVERKEEPER, COMMENTS ON THE REVISED DRAFT SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM, WELL PERMIT ISSUANCE FOR HORIZONTAL DRILLING AND HIGH-VOLUME HYDRAULIC FRACTURING TO DEVELOP THE MARCELLUS SHALE AND OTHER LOW-PERMEABILITY RESERVOIRS 3 (2012), available at http://newyork.sierraclub.org/documents/NRDCetal.CommentsonRDSGEISandProposedRegulations110111_000.pdf [hereinafter JOINT COMMENTS].

²¹⁰ CATSKILL MOUNTAINKEEPER, DEL. RIVERKEEPER NETWORK, EARTHJUSTICE, THE NAT. RES. DEF. COUNCIL, RIVERKEEPER & THE SIERRA CLUB, JOINT LEGAL MEMORANDUM ON THE REVISED DRAFT SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM AND PROPOSED REGULATIONS FOR HORIZONTAL DRILLING AND HIGH VOLUME HYDRAULIC FRACTURING IN THE MARCELLUS SHALE AND OTHER LOW-PERMEABILITY RESERVOIRS 1 (2012), available at http://newyork.sierraclub.org/documents/JointLegalComments.FINAL_000.pdf [hereinafter JOINT LEGAL MEMORANDUM] (citing *Webster Assocs. v. Town of Webster*, 59 N.Y.2d 220, 228 (1983)) (“[T]he omission of a required item from a draft EIS cannot be cured simply by including the item in the final EIS.”).

²¹¹ *Id.* at 25 (stating that NYSDEC is unlikely to have the staffing capacity to respond to unconventional natural gas extraction until, at the earliest, 2014, if at all).

²¹² *Id.* at 21.

waste.²¹³ Similarly lacking is an analysis of pipeline construction for expanding gas drilling,²¹⁴ or a quantification of negative socioeconomic and community impacts.²¹⁵ The RDSGEIS highlights potential economic benefits of extracting natural gas without an analysis of likely costs ranging from emergency response to monitoring, and does not speak to the adverse impacts of a sudden influx of transient population followed by a steep fall in economic prospects for long-term residents.²¹⁶

Taking the oil spill fund approach, the following measures should be enacted before any drilling takes place: strict liability on operators of drilling sites that cause contamination, NYSDEC capacity to order immediate owner/operator cleanup or take over clean up, funding a Natural Gas Damage Recovery Fund through surcharges on natural gas permits, and requiring owner/operator surety bonds to cover remediation costs.²¹⁷

New York should require “bonding and insurance that addresses the costs and risks of long-term monitoring; publicly incurred response and cleanup operations; site remediation and well abandonment; and adequate compensation to the public for adverse impacts”²¹⁸ Given the one in four chance of flooding in a thirty-year project life for wells in one-hundred-year floodplains, setbacks should be substantially increased.²¹⁹ New York does not explain why a public water supply should have a 2,000-foot setback when private water wells only receive 500-foot setbacks.²²⁰ It would be sensible for local zoning authorities to have authority to determine threshold setbacks beyond the state minimum to meet the needs of community characteristics and site-specific issues.²²¹

New York should require state inspections of all well cementing and keep permanent records. “DEC has at least partial records on 40,000 wells, but estimates that over 75,000 oil and gas wells have been drilled in the State since the 1820s. Most of the wells date from before New York established a regulatory program. Many of these old wells were never properly plugged”²²² Such wells provide a vertical pollutant

²¹³ See *id.* at 6.

²¹⁴ *Id.*

²¹⁵ *Id.* at 8 (“[S]ocioeconomic and environmental justice analysis requires examination of reasonably foreseeable impacts on noise; historic resources; aesthetic resources; traffic; short- and long-term population concentration, distribution, or growth; and community character, all of which are specifically protected by SEQRA.”).

²¹⁶ *Id.* at 6.

²¹⁷ *Id.* at 9.

²¹⁸ See JOINT COMMENTS, *supra* note 209, at 172.

²¹⁹ See *id.* at 137.

²²⁰ *Id.* at 132.

²²¹ *Id.* at 136.

²²² *Id.* at 50. “Permanent Abandonment. A well that is no longer needed to produce hydrocarbons should be plugged (e.g. cement barriers installed, failed casing removed,

pathway.²²³ NRDC et. al. argue that, “[b]uffer zone size should increase with geologic and technical uncertainty. Buffer zone size may decrease as industry gains experience and data quality/quantity improves.”²²⁴ Buffer zones around water supplies should be permanent and apply to all drinking water supplies.²²⁵ NRDC et. al. explains that:

In order to ensure that the uniquely unfiltered New York City and Syracuse watersheds remain unscathed, NYS-DEC should increase its proposed 4,000-foot buffer to preclude any horizontal drilling under these watersheds sufficient to account for the length of current or future horizontal well bores. Moreover, it appears that vertical drilling and low-volume hydraulic fracturing would still be permitted in these areas, even though they present the same kinds of risks. NYSDEC should address these issues and clearly prohibit any activities related to natural gas development in and under these watersheds and buffer areas.²²⁶

Furthermore, the seismic activities associated with unconventional natural gas development and wastewater disposal threaten the stability of aging and vulnerable water infrastructure.²²⁷ Public participation has been core to keeping open the legal option to establish “permanent, protective buffer areas in and around all watersheds” upon which drinking supplies depend.²²⁸

Mandatory prior disclosure of chemical threats presented by all aspects of unconventional natural gas development should predate drilling given the importance of baseline information with which to prove harm in legal proceedings. The RDSGEIS proposed prior disclosure of chemical additive products by product name and purpose/type, and the proposed percent ratio follows the sensible mandatory prior disclosure best practice modeled by Wyoming²²⁹ but should be expanded to all chemical threats posed by unconventional natural gas development.²³⁰

mechanical plugs set), surface equipment removed (e.g. wellhead and piping), and permanently abandoned.” *Id.* at 49.

²²³ *Id.* at 51. New York “requires only 15’ cement plugs, as compared to Texas, Alaska, and Pennsylvania regulations that require a series of 50’-200’ cement plugs at various locations within the wellbore.” *Id.* at 53.

²²⁴ *Id.* at 67.

²²⁵ JOINT LEGAL MEMORANDUM, *supra* note 210, at 12.

²²⁶ *Id.* at 11 (emphasis omitted).

²²⁷ *Id.* (“Allowing unsafe drilling activities to occur near aging and vulnerable water supply infrastructure poses an unreasonable risk to public health and emergency preparedness.”).

²²⁸ *See id.* at 12.

²²⁹ *See* 3 WYO. CODE R. § 45 (LexisNexis 2010).

²³⁰ *See* JOINT LEGAL MEMORANDUM, *supra* note 210, at 17 (“Because drilling mud uses similar chemicals as hydraulic fracturing fluid, it poses many of the same hazards to the envi-

New York should disclose individual chemicals, identified by Chemicals Abstracts Service numbers in addition to available material data safety sheets (MSDS), and a statement of the amount of each chemical used. This legal advice builds upon emerging best practice models in Texas, Colorado, and Wyoming.²³¹ New York's final environmental impact analysis should reference these experienced energy-producing states' decisions to use their police powers to regulate dangerous chemicals to protect public health and environmental integrity. Colorado responded to industry concern that competitors might reverse engineer hydraulic fracturing additives by clarifying that Colorado disclosure of all additives and all chemicals does not require specific lists of chemical ingredients.²³²

Mandating the use of the safest chemical additives and unconventional natural gas development methods is as equally important as the reporting of chemicals. This broader analysis belongs in any New York environmental impact assessment. SEQRA is designed to provide an opportunity for state decision-making to be informed, incorporating a genuine understanding of public health and environmental externalities resulting from permitting decisions. While re-establishing federal safeguards requires cooperation in Congress, New York is in a position to implement federal Emergency Planning and Community Right-to-Know Act (EPCRA) standards²³³ rather than the general trade secret provisions of 6 N.Y.C.R.R. section 616.7. Doing so would fold New York's unconventional natural gas extraction into a trade secret approach designed to weigh intellectual property rights against public health. In particular, retaining the public right to information would balance the influence of industry on public decision-making with informed analysis on public

ronment and human health as hydraulic fracturing fluid, and should be subject to the same disclosure requirements.”).

²³¹ See *id.* at 15 (citing 16 TEX. ADMIN. CODE § 3.29(c)(1)). The Colorado Oil and Gas Conservation Commission released a final draft for updated rules on December 13, 2011, which requires disclosure of individual chemical constituents in addition to disclosure of additives. See COLO. CODE REGS. § 404-1-205A(B)(2)(A)(IX)-(XII) (2011). Wyoming's rules also require disclosure of additives as well as the Chemical Abstracts Number for individual chemicals. See 3 WYO. CODE R. § 45(d) (LexisNexis 2010); see also 16 TEX. ADMIN. CODE § 3.29(c)(2)(ix).

²³² See JOINT LEGAL MEMORANDUM, *supra* note 210, at 16 (referring to COLO. CODE REGS. § 404-1-205A(B)(2)(A)(IX)-(XII) (2011)); COLORADO DEP'T OF NAT. RES., OIL & GAS CONSERVATION COMM'N, AMENDMENTS TO 100 SERIES DEFINITIONS, 200 SERIES GENERAL RULES, 300 SERIES DRILLING, DEVELOPMENT, PRODUCTION, AND ABANDONMENT RULES AND 500 SERIES PRACTICE AND PROCEDURE RULES, STATEMENT OF BASIS, SPECIFIC STATUTORY AUTHORITY, AND PURPOSE 3-4 (2012).

²³³ The relevant EPCRA regulations can be found at Protection of Environment, 40 C.F.R. pt. 350 (2012).

health. EPCRA mandates public release of adverse health effects associated with each secret chemical.²³⁴

Flaring/venting methane while drilling and completion cause substantial greenhouse gas emissions.²³⁵ Reduced Emission Completions (RECs) that capture greenhouse gas emissions²³⁶ should be required for wells drilled prior to construction of gathering lines.²³⁷ Because “captured gas can be used for fuel, offsetting operating costs, or re-injected to improve well performance,” RECs are both an environmental best practice and profitable.²³⁸ New York ambient air quality monitoring “needs further definition, a funding commitment, and a formal industry compliance obligation.”²³⁹ New York should require measureable, enforceable greenhouse gas mitigation plans for all natural gas operations, requiring Natural Gas STAR Program best management technologies and practices.²⁴⁰

C. Local Governments

Layered on top of corporate instincts to preserve competitive advantage and maximize profits are public sector instincts to preserve sovereignty.²⁴¹ In the absence of comprehensive federal and state regulation, local governments are hard pressed to respond to unconventional natural gas extraction, particularly under the natural-gas-developer-favored legal interpretation that New York’s Oil, Gas and Solution Mining Law (OGSML)²⁴² preempts local zoning and land use control of the location of natural gas wells—a position still seeking clarity via a slow path through the judicial system.

Given the cursory analysis of the no-action option, the RDSGEIS should be substantially revised. Doing so would provide room for a discussion of cooperative and inclusive decision-making rather than jump-

²³⁴ *Id.* § 350.21.

²³⁵ See JOINT COMMENTS, *supra* note 209, at 113–14.

²³⁶ See *id.* at 116.

²³⁷ See *id.*

²³⁸ *Id.* at 117.

²³⁹ *Id.* at 110; see also *id.* at 108 (“The modeling analysis assumed that there will be no emissions of criteria pollutants from venting. However, the RDSGEIS proposes to allow gas venting of up to 5 MMscf during any consecutive 12-month period, including sour gas, as long as it is vented at least 30 feet in the air. This allowance undermines the assumption that no criteria pollutants would be emitted during venting. The modeling analysis assumes only three days of gas flaring per well. However, the RDSGEIS states that flaring can occur for up to a month in some cases. Therefore, the modeling understates the potential emissions from flaring.”).

²⁴⁰ *Id.* at 113.

²⁴¹ See Joseph A. Dammal, *Notes from Underground: Hydraulic Fracturing in the Marcellus Shale*, 12 MINN. J. L. SCI. & TECH. 773, 806–07 (2011) (different layers of government do not always seek opportunities to work together).

²⁴² See N.Y. ENVTL. CONSERV. LAW § 23-0303(2) (McKinney 2012).

ing straight to Environmental Conservation Law (ECL) section 23-0303(2) language stating that OGSML supersedes local governance beyond local roads and real property tax collection.²⁴³ Villages are hard pressed to distinguish between road use by heavy agricultural vehicles and heavy industrial trucks on sheer design of vehicle and weight on rural dirt roads. Energy siting and environmentally sound energy-water development can best be sustained through coordination among layers of government, recognition of the need to prioritize health and ecosystem services, and stakeholder participation that does not favor well-resourced industrial representatives.

Access to information and public participation should not be limited solely to issuance of drilling permits in state parks within 2,000 feet of public water supply wells, and disturbance of more than two-and-one-half acres in agricultural districts, pursuant to New York's SEQRA participation provisions.²⁴⁴ Whether focusing on the NEPA inclusive review procedures or state corollaries, such as SEQRA, the objective should be to broadly share information to better understand adverse impacts and avert harmful activity before widespread damage occurs.

New York's RDSGEIS recommends additional public input on the following: issuance of a permit to drill when high-volume hydraulic fracturing is proposed shallower than 2,000 feet along the proposed wellbore; where the top of the target fracture zone of the wellbore is less than 1,000 feet below a known fresh water supply; and where a well pad is within 500 feet of a principal aquifer.²⁴⁵ Yet the report qualifies that re-evaluation of this latter provision occurs in two years.²⁴⁶ Other activities deemed worthy of public input by New York include: water withdrawals and drilling well pad distances "within 150 feet of a perennial or intermittent stream, storm drain, lake or pond;" "ground water withdrawal within 500 feet of a private well;" or "ground water withdrawal within 500 feet of a wetland that pump test data shows would have an influence on the wetland."²⁴⁷ Yet fragmented well-pad-by-well-pad public review is unlikely to result in adequate enforcement of health and environmental protections when compared with comprehensive prohibitions on negatively impacting water supplies.

Similarly, local government notification based upon the following statement is unlikely to lead to cooperative governance needed to prevent natural gas extraction from resulting in substantial adverse impacts. A passing mention in New York's RDSGEIS urging Road-Use Agreements

²⁴³ See NEW YORK RDSGEIS, *supra* note 133, at 3-4.

²⁴⁴ *Id.* at 3-15 to 3-16.

²⁴⁵ *Id.* at 3-15.

²⁴⁶ *Id.* at 3-16.

²⁴⁷ *Id.* at 3-15 to 3-16.

between drillers and municipalities does not go far enough to address the need to involve local governments in siting, safety, disposal, and other important decisions going forward. First and foremost, elected local officials are well-positioned to be part of the decision-making process regarding no-action approaches to natural gas extraction as well as the scope of operations if permits are to be issued. Stating in a draft environmental impact statement that state exclusive authority to issue well permits supersedes local government authority over well siting, and that permits will be issued irrespective of conflicting local land use laws/regulations/ plans/policies,²⁴⁸ does not indicate a willingness to coordinate effective regulation of unconventional natural gas regulation. Requiring applicants to list conflicting local law and stating that substantial adverse impacts will be considered does not go far enough to committing to cooperative, inclusive decision-making.

The New York RDSGEIS reads as a warning to other layers of government to back off from DEC jurisdictional turf to issue permits. Beyond stating that permits will be issued in keeping with departmental capacity, insufficient discussion of how county health departments are to effectively respond to drinking water contamination remains to be developed by the state of New York. Regulations ranging from updated well casing requirements to emergency response plans should apply to all natural gas development in New York. Furthermore, indirect and cumulative impacts should be part of New York's environmental impact assessment.

V. RECOMMENDATIONS: ADAPTIVE FEDERALISM AND THE REGULATORY COMMONS

A. *Collaborative Governance*

A useful framework for inclusive decision-making involves the following: gathering stakeholders and information and then brainstorming and analyzing options before implementing any given approach. Polarized communities may benefit from skilled facilitator expertise grounded in mediation approaches that can enhance collaborative governance. Enhancing public participation at the outset (in pre-application and pre-environmental assessment contexts) can help optimize genuine sustainable development.

This can include broad stakeholder discussion to identify appropriate locations for unconventional natural gas extraction given reliance on shared water resources, bioaccumulation of contaminants, ecosystem fragility, density of human settlements, and other important factors that need to be addressed before industrial production should be authorized.

²⁴⁸ *Id.* at 3-14.

Gathering expertise from such a broad forum can begin the process of identifying best practices to minimize negative impacts, not only at the local level but also comprehensively evaluating externalities and conscientiously internalizing them. Model ordinances, leases,²⁴⁹ and public-private bodies that can facilitate lifecycle analysis, and inclusive decision-making can sustain healthy communities both economically and with regard to public health and environmental integrity. This process can provide a base upon which to make the range of decisions from whether/where to site to adequate bonding arrangements for eventual decommission or possible problems with operation.

If natural gas is to receive special support as a “transition fuel,” then firm renewable targets for renewable energy production and efficiency should be legally mandated as an integral part of any effort to publically support unconventional natural gas extraction.²⁵⁰

Participatory planning can go beyond deliberative polling and can occur well before the process has reached a mitigation discussion.²⁵¹ Doing so may change the dynamic described by Sean Nolon in which success tends to depend upon siting negotiation in which “(1) each party must possess something to trade; (2) ‘deals’ must be possible that are better than ‘no deal’; (3) each party must trust that the other will honor its promises; and (4) each party must believe the above is true.”²⁵²

Societal agreement to transition away from oil and coal may not equate to local siting coordination on given energy projects. What appears to be a clear police power to some looks more like a governmental taking of private property to others. Jurisdictions do not have free reign to require setbacks and other mitigating measures in light of existing jurisprudence.

²⁴⁹ See *Drillers Fail to Share Fracking Risks With Landowners – EWG*, GREENWIRE, Dec. 12, 2011, <http://www.eenews.net/Greenwire/rss/2011/12/12/11> (“Natural gas companies that employ hydraulic fracturing are disclosing drilling risks to shareholders but not to landowners . . .”).

²⁵⁰ See generally Elizabeth Burleson, *Wind Power, National Security, and Sound Energy Policy*, 17 PENN ST. ENVTL. L. REV. 137 (2009).

²⁵¹ See Negotiated Rulemaking Act, 5 U.S.C. §§ 563–68 (2006) (Inclusive decision-making can begin well before this rulemaking stage in which a representative group of stakeholders tend to focus on consensus building with regard to mitigating measures rather than whether to conduct the activity at all.). See also *Envtl. Working Group v. N.Y. Dep’t Env’tl. Conservation*, No. 5159-12 (N.Y. Sup. Ct. filed Sept. 17, 2012) (lawsuit filed by Environmental Working Group against NYSDEC and the Governor to obtain documents related to the drafting of state rules to limit hydraulic fracturing to extract natural gas); Chris Dolmetsch, *New York Sued by Environmental Group Seeking Fracking Documents*, BLOOMBERG, Sept. 19, 2012, <http://www.bloomberg.com/news/2012-09-19/new-york-sued-by-environmental-group-seeking-fracking-documents.html>.

²⁵² Sean Nolon, *supra* note 57, at 369 (citing MICHAEL O’HARE ET AL., FACILITY SITING AND PUBLIC OPPOSITION 90 (1983)).

To this author, best practices involve meaningfully involving experts and civil society when value judgments are at issue so that consensus can be reached regarding optimal energy siting that does not unacceptably compromise environmental and public health. Such collaborative decision-making requires the public sector to adequately support inclusive processes with technical and advisory support as well as provide oversight regarding unacceptable health and environmental thresholds that should not be exchanged for short-term monetary gains. This might look like a public-private body comparable to a transboundary water commission, but one that is resilient in the face of regulatory capture.

B. *Environmental and Health Impact Assessments*

The federal government should conduct a national environmental impact analysis of unconventional natural gas extraction to ensure that any development is done as safely as possible. This can best be accomplished through broad access to information, public participation, and access to justice. This process can lead to innovations that optimize safe and environmentally sound technologies and procedures.²⁵³

Health Impact Assessments (HIAs) should also be conducted before any unconventional natural gas development commences; HIAs have been carried out for Bureau of Land Management oil and gas extraction plans for Alaska's North Slope²⁵⁴ as well as for natural gas development in Garfield County, Colorado.²⁵⁵

C. *No Action Option*

France has said no to hydrofracking.²⁵⁶ Before any discussion of buffer zones, flowback provisions, and other ways to mitigate unconventional natural gas extraction, there should be a full and inclusive process of decision-making concerning whether unconventional natural gas extraction should be authorized.

²⁵³ See generally Elizabeth Burleson, *Energy Policy, Intellectual Property, and Technology Transfer to Address Climate Change*, 18 *TRANSNAT'L. L. & CONTEMP. PROBS.* 69 (2009).

²⁵⁴ See Rajiv Bhatia & Aaron Wernham, *Integrating Human Health into Environmental Impact Assessment: An Unrealized Opportunity for Environmental Health and Justice*, 116 *ENVTL. HEALTH PERSP.* 991, 991–1000 (2008), available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2516559/>.

²⁵⁵ See ROXANNA WITTER ET AL., *COLO. SCH. OF PUB. HEALTH, HEALTH IMPACT ASSESSMENT FOR BATTLEMENT MESA, GARFIELD COUNTY COLORADO* (2010).

²⁵⁶ See Tara Patel, *France Vote Outlaws 'Fracking' Shale for Natural Gas, Oil Extraction*, BLOOMBERG, July 1, 2011, <http://www.bloomberg.com/news/2011-07-01/france-vote-outlaws-fracking-shale-for-natural-gas-oil-extraction.html>.

The no-action alternative, a prohibition on development of the Marcellus and Utica Shale²⁵⁷ plays in New York, was not considered beyond stating that, while none of the adverse impacts would occur, none of the economic benefits would occur either. For an environmental impact statement, this is notably cryptic. The organizational decision-making in designing the RDSGEIS is also striking. The economic benefits are described at length up front, while the no-action alternative is given little more than four paragraphs on pages 9-1 to 9-3 and is quickly followed by a phased permitting approach.²⁵⁸ Beginning an environmental impact analysis with a lengthy narrative on potential drilling jobs followed by paltry text on sustaining a moratorium does not appear to meet the statutory requirements of environmental impact analysis. It is inadequate to make a reference to the public interest language in Article 23-0301 of the ECL²⁵⁹ without balancing the public's need for energy with (1) the public interest in investing in renewable energy, (2) the public interest in substantially lowering such greenhouse gases as methane (natural gas), and (3) the public interest to protect the drinking water of approximately eight million people in New York City. As a revised draft environmental impact statement, the lack of discussion of the full impact on the environment by natural gas extraction is striking.

While it is in the public interest for home heating prices to be affordable, it is not in the public interest to ramp up natural gas production to ensure very cheap methane production and consumption without regard to public health and environmental integrity. The discussion of environmental safeguards that are genuinely protective of water supplies and habitats is a nascent one that has yet to bring informed stakeholders to the table to broaden the public/private understanding of the scope and depth of adverse impacts from natural gas extraction. It is not clear that natural gas is an adequate "bridging fuel" to renewable energy; MIT has found that natural gas production appears to be stunting renewable en-

²⁵⁷ See JOINT COMMENTS, *supra* note 209, at 3 (While the RDSGEIS mentions baseline geologic aspects of the Utica shale, the lack of environmental impact assessment on depths other than the Marcellus shale makes it important for this analysis to occur; require Utica Shale or other unnamed low-permeability gas reservoir development have site-specific supplemental environmental impact statement review; or issue future SGEIS beyond the Marcellus shale.).

²⁵⁸ See NEW YORK RDSGEIS, *supra* note 133, at 9-1 to 9-3.

²⁵⁹ See N.Y. ENVTL. CONSERV. LAW § 23-0301 (McKinney 2007) ("It is hereby declared to be in the public interest to regulate the development, production and utilization of natural resources of oil and gas in this state in such a manner as will prevent waste; to authorize and to provide for the operation and development of oil and gas properties in such a manner that a greater ultimate recovery of oil and gas may be had, and that the correlative rights of all owners and the rights of all persons including landowners and the general public may be fully protected, and to provide in similar fashion for the underground storage of gas, the solution mining of salt and geothermal, stratigraphic and brine disposal wells.").

ergy.²⁶⁰ Environmentally sound energy use is in the public interest, as is enhancing efficiency, conservation, and the array of energy sources that optimize environmentally sound, sustainable development.

It is insufficient to say, in an environmental impact statement, that increasing the supply of unconventional natural gas will lower prices of natural gas and then move quickly to job production. Renewable energy also creates jobs.²⁶¹ Pitting job creation against environmentally sound energy use is not an analytical exercise and should not be the only discussion occurring in an environmental impact statement. The no-action section of the RDSGEIS is not the appropriate location to continue an already extensive discussion regarding drilling jobs, private mineral royalties, and subsequent state taxes. This author finds the following statement insufficient for a no-action analysis in an environmental impact statement (draft or otherwise):

The no-action alternative is also not favored because most of the potential significant adverse impacts identified in this Supplement can be fully mitigated by the measures outlined in Chapter 7. Other significant adverse impacts can be partially mitigated, or are temporary in nature. A prohibition would also deny owners of mineral interests an opportunity to realize the benefit of mineral rights ownership. Accordingly, it is not a recommended alternative to the rational and controlled development proposed in this Supplement.²⁶²

New York's phased permitting approach raises but does not adequately address the need to protect New York's drinking watersheds. Simply waiting several years before permitting drilling over aquifers²⁶³ is not a viable approach to promote public safety, a paramount public interest and one that permits states to utilize police powers to protect the public.

This author's definition of energy security does not include jeopardizing public water supplies. Temporarily delaying permitting in NYC and Syracuse watersheds does not adequately address sustaining public water supply protective measures. The following recommendation by the RDSGEIS should be strengthened to promote public safety:

[W]ell pads for high-volume hydraulic fracturing [would not be permitted] within 2,000 feet of public water supply wells, river or stream intakes or reservoirs until at

²⁶⁰ See Jacoby et al., *supra* note 1, at 37–39.

²⁶¹ See, e.g., RENEWABLE ENERGY JOBS, BROWSE RENEWABLE ENERGY JOBS, <http://www.renewableenergyjobs.com> (last visited Oct. 10, 2012); RENEWABLE ENERGY WORLD, JOBS HOME, <http://www.renewableenergyworld.com/rea/careers> (last visited Oct. 10, 2012).

²⁶² See NEW YORK RDSGEIS, *supra* note 133, at 9-3.

²⁶³ See *id.* at 9-6.

least 3 years after issuance of the first permit for high-volume hydraulic fracturing. Reconsideration of this prohibition at that time would be based on actual experience and impacts associated with permit issuance outside these buffer zones. This approach functions as a partial “phased” permitting approach because it prohibits and limits activities in areas deemed to be especially sensitive where a phased and cautious approach is merited.²⁶⁴

A cautious approach is necessary everywhere, as is serious consideration of a genuine buffer zone that does not allow industrial activity under or near drinking water supplies. Genuinely independent experts and individuals whose drinking water is at stake should be brought into the decision-making process in a meaningful way that enhances both understanding and insight for sustaining public health and environmental integrity. Is placing a drill pad 2,000 feet from the edge of a public water well a sufficient distance to permit drilling when horizontal drilling can extend a mile from the drill pad under the water supply? Is delaying only high-volume hydraulic fracturing within 500 feet from a primary aquifer for two years an adequate scope, distance, and timeframe? Should independent non-industry scientists be determining these safety thresholds before drilling commences rather than on a piecemeal level over the next several years in isolated case studies? Should only two to three years rather than the long term be considered a sufficient precautionary window with which to refrain from drilling over public water supplies? What about private wells and the individuals who will be drinking water from these wells over the next several years whose health may be at stake while studies progress slowly? If site specific SEQRA determinations are as deferential to drilling jobs, lowering natural gas prices, and tax revenues over actual environmental impacts, then do individualized reviews of this time adequately protect water supplies? It will be difficult for each local water supply impact to outweigh the generalized projections of economic advantages that proponents of fracking advance to promote unconventional natural gas extraction. Should fragmented site-specific studies be relied upon with regard to protecting drinking water when blanket prohibitions against drilling in the vicinity of drinking water supplies could be both more economically efficient and environmentally protective? Asking such questions could result in different recommendations than those released by the NYSDEC in its RDSGEIS.

Budgetary constraints are an unpredictable proxy for health or environmental enforcement. On page 9-7, the RDSGEIS “proposes to limit

²⁶⁴ See *id.*

the number of permits it issues to match the Department resources that are made available to review and approve permit applications and to adequately inspect well pads and enforce permit conditions and regulations.”²⁶⁵ This statement hangs at the end of the discussion on protecting drinking supplies, presumably as an insufficient means of soothing public concern.

Given the placement of the discussion of non-chemical fracturing technologies and additives within the alternatives section of the RD-SGEIS, it is inadequate to end the discussion with “further research . . . is warranted . . .”²⁶⁶ The report acknowledges that, “recognition of potential hazards has motivated investigation into environmentally-friendly alternatives for hydraulic fracturing technologies and chemical additives.”²⁶⁷ The report also recognizes that, to date, greener technologies reduce without eliminating toxicity in unconventional natural gas extraction.²⁶⁸ The NYSDEC should greatly expand the report’s recommendation of full lifecycle analysis of chemical impacts to include the entire range of adverse impacts resulting from unconventional natural gas extraction, rather than solely the development of less toxic hydraulic fracturing fluids.

While stabilizing short-term domestic energy needs is a valid argument in its own right, an analytically robust lifecycle analysis of energy sources and efficiency measures is long overdue and should be conducted by the public sector before jeopardizing drinking water supplies on the grounds that energy security depends upon compromising water security.

D. Enhancing Federal Law Covering Natural Gas Extraction

Congress should reestablish federal thresholds that can protect public health and the environment from unconventional natural gas operations. Enacting the FRAC Act to close the Halliburton Loophole²⁶⁹ would be a sensible first step. In 2009, companion bills H.R. 2766 and S. 1215 were introduced into Congress to amend the SDWA to once again cover hydraulic fracturing.²⁷⁰ The FRAC Act was reintroduced in 2011 but has yet to build the political steam necessary to amend the SDWA definition of “underground injection” to include injection in the

²⁶⁵ *Id.* at 9-7.

²⁶⁶ *Id.*

²⁶⁷ *Id.*

²⁶⁸ *Id.*

²⁶⁹ On June 9, 2009, Sen. Bob Casey Jr. (D-Pa.) introduced Senate Bill 1215 into the 111th Congress—the Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, S. 1215, 111th Cong. (2009).

²⁷⁰ See *id.*; Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, H.R. 2766, 111th Cong. (2009).

context of hydraulic fracturing.²⁷¹ The FRAC Act would also mandate public disclosure of chemicals used in unconventional natural gas production while retaining industry proprietary control over chemical formulas.²⁷²

This analysis is mindful of industry's interest in minimizing external oversight and maximizing secrecy of operations. Property law in the United States is an ongoing balancing act among protecting the general public, preserving the public trust, and recognizing individual property rights. Police powers are powerful and can be used to require development to adhere to sustainability criteria.²⁷³ In the context of natural gas extraction in residential communities, brick production looks benign. Intellectual property rights are not more sacred than other property rights or public health.

Reestablishing comprehensive federal thresholds for drinking water that encompass natural gas extraction would bring mandatory disclosure back to the comparatively better-resourced federal level. A federal floor and data collection process would provide vital information that would allow both technology and regulations to adapt to sustainable water-energy-climate policy.

The unconventional natural gas industry is comparable to numerous other economic sectors, both in the energy field and beyond, that are subject to federal regulation. Hannah Wiseman has analyzed the similarities between unconventional natural gas extraction and coal mining, both of which vary from one location to another without impeding the EPA's capacity to regulate impoundments and related activities.²⁷⁴ The United States is witnessing an unprecedented regulatory drafting race to the bottom in the context of unconventional natural gas extraction. Proposed state and DRBC regulations read like internal industry reports rather than comprehensive rules capable of internalizing the range of public health and environmental impacts that result from unconventional natural gas development.

Given the regulatory gaps in climate-energy-water governance, transboundary coordination should focus on enhancing existing legislation and drafting acceptable new provisions that balance public health with energy dependence and ecosystem sustainability. Inclusive deci-

²⁷¹ See S. 587, 112th Cong. §2(a) (2011); H.R. 1084, 112th Cong. §2(a) (2011).

²⁷² See S. 587, 112th Cong. §2(b); H.R. 1084, 112th Cong. §2(b); Susan L. Sakmar, *The Global Shale Gas Initiative: Will the United States be the Role Model for the Development of Shale Gas Around the World?*, 33 Hous. J. INT'L L. 369, 410–11 (2011); see also FRACTURING RESPONSIBILITY AND AWARENESS OF CHEMICALS ACT OF 2011, GOVTRACK.US, <http://www.govtrack.us/congress/bill.xpd?bill=h112-1084> (last visited Sept. 27, 2012).

²⁷³ See *Hadacheck v. Sebastian*, 239 U.S. 394, 410–11 (1915) (recognizing broad police power).

²⁷⁴ Wiseman, *supra* note 122, at 288–89.

sion-making can result in unconventional natural gas regulations that are as effective as federal Emergency Planning and Community Right-to-Know Act coverage.

1. Disclosures, Environmentally Sound Innovation, and Adaptive Management

Intellectual property rights and safety standards should not be mutually exclusive. Disclosure would incentivize internalizing adverse impacts of gas extraction and help decision-makers identify best practices. Disclosure data can inform decision-making by making available empirical data that would allow decision-makers to determine minimally environmentally damaging extraction methods. This process could be strengthened by collaborative analysis among jurisdictions, publicly funded university researchers, and the private sector.

Regulation can force technological innovation by ruling out chemicals with unacceptable impacts on the environment and human health. Pooling all current information regarding the adverse impacts of unconventional natural gas extraction not only facilitates lifecycle analysis across energy options, but may also enable natural gas production to proceed using effective methods that minimize adverse impacts to environmental and human health. This remains an open question in need of further study based on open information sharing and meaningful involvement by relevant actors.

Adaptive management of unconventional natural gas extraction can involve banning unacceptably harmful chemicals and methods as soon as best practices are identified and proven effective. While geology and water availability vary across drilling locations, public-private research capacity is robust enough to identify best practices for a wide array of factors given current coding, mapping, and analytical expertise. Interdisciplinary and transboundary cooperation can replace random industry experimentation that currently occurs at the expense of public health and environmental integrity.

Incentivizing innovation through intellectual property right protection is a well-established public good, but it must be weighed against other public goods, such as public health. Trade secrets and the corporate revenue stream protected by such secrets do not outweigh the legal requirements to sustain safe drinking water.²⁷⁵

Police power to protect public health need not impede innovation in energy diversification. Intellectual property law protects companies through trade secrets, patents, copyrights, and trademarks. This field of law has long balanced the property rights of innovators with the public

²⁷⁵ See Burleson & Burleson, *supra* note 30, at 670.

interest in broadly available goods.²⁷⁶ For this reason, some property rights expire after a reasonable timeframe when the given innovation becomes part of the public domain.²⁷⁷ As long as a trade secret remains a secret, owners can sustain revenue streams well beyond the common patent timeframes. Trade secret law has protected the Coca Cola formula for over a century, yet trade secret law is not immune from the balancing of public health and property rights. Ultimately, the public sector has the police power to place the public safety before monetary gain by a given industry.

Groundwater protections and recycling requirements can provide incentives for technological innovation to adequately address the water pollution associated with natural gas production. Maximizing the recycling of flowback water is an area in need of greater innovation if natural gas development is to proceed. To date, the cost of wastewater recycling far exceeds that of injecting contaminated water into underground formations.²⁷⁸ Seismic instability, however, appears to present serious challenges to the practice of blasting large volumes of wastewater underground.²⁷⁹ Filling the regulatory gaps governing unconventional natural gas can be done in a manner that sustains energy innovation as well as robust public health and environmental measures.

2. Energy Security, Climate Stability, and Good Governance

This author recommends that the leakage rates of unconventional natural gas extraction be ascertained and compared with the greenhouse gas footprint of other energy options before public/private resources are committed to further development. Debating the relative emissions of natural gas flaring and leakage,²⁸⁰ as opposed to mountain top removal

²⁷⁶ AIDS drug availability in Africa presents another context in which public health and proprietary property rights have been weighed, leading to broader AIDS drug availability. See generally Horace Anderson, *We Can Work It Out: Co-Op Compulsory Licensing as the Way Forward in Improving Access to Anti-Retroviral Drugs*, 16 B.U. J. SCI. & TECH. L. 167 (2010); Brook K. Baker, *ACTA: Risks of Third-Party Enforcement for Access to Medicines*, 26 AM. U. INT'L L. REV. 579 (2011); Linda Fentiman, *AIDS as a Chronic Illness: A Cautionary Tale for the End of the Twentieth Century*, 61 ALB. L. REV. 989 (1998).

²⁷⁷ See generally Ann Bartow, *Open Access, Law, Knowledge, Copyrights, Dominance and Subordination*, 10 LEWIS & CLARK L. REV. 869 (2006).

²⁷⁸ See ENVTL. PROT. AGENCY, NATURAL GAS DRILLING IN THE MARCELLUS SHALE: NPDES PROGRAM FREQUENTLY ASKED QUESTIONS 3 (2011), available at http://www.epa.gov/npdespub/pubs/hydrofracturing_faq.pdf; R. Marcus Cady II, *Drilling Into the Issues: A Critical Analysis of Urban Drilling's Legal, Environmental, and Regulatory Implications*, 16 TEX. WESLEYAN L. REV. 127, 146 (2009); see generally Symposium, 'Shale' We Drill? *The Legal and Environmental Impacts of Extracting Natural Gas From Marcellus Shale*, 22 VILL. ENVTL. L.J. 189 (2011) [hereinafter Symposium, 'Shale' We Drill?] (discussing recycling, treatment, and injection of wastewater under ground).

²⁷⁹ See 4.0 *Earthquake*, *supra* note 18.

²⁸⁰ See Symposium, 'Shale' We Drill?, *supra* note 278, at 198 ("Air pollution occurs at nearly every stage of the construction and drilling phase of an oil and gas well.").

coal production, strikes this author as a race to the bottom. Broadly sharing accurate life-cycle analysis across all energy options can facilitate energy sustainable development.

First and foremost, strict regulations need to be enforced to prohibit flaring natural gas. Industry flaring, venting, and release of natural gas have substantial climate destabilizing consequences.²⁸¹ Less clear are the rates of flaring and the projected leakage rates for natural gas production and transport, yet, these numbers matter when trying to assess the relative impacts of natural gas vis-à-vis coal, oil, or nuclear cradle to grave impacts. Cornell professors are struggling to come to terms with whether natural gas should become a bridging fuel.²⁸²

This author recommends enhancing disclosure requirements for the full range of data necessary to generate life-cycle analysis, including industry-wide greenhouse gas emission rates. This can be done at the stage of participating in the stock market, obtaining insurance, qualifying for public subsidies, before receiving tax-advantaged status, when amending existing environmental statutes such as the Clean Air Act, or by EPA rule-making, just to mention a few approaches. Given the international nature of the climate collective action problem, such legal requirements could be written into the climate instrument that countries have recently committed to ratify by 2020.²⁸³ A Rip Van Winkle siesta until then is not advisable; there is a need for local momentum to continue to propel environmentally sound decisions into the constrained market place. Local impacts in the form of cancer spikes in given communities allow ordinary citizens to highlight the inequity of allowing large corporations to continue to externalize pollution costs. Neighboring communities care about both steady employment and averting terminal illnesses as a result of exposure to contaminants. All this ground is well-trodden by this author and many others across a myriad of fields of inquiry, and yet all this inquiring has yet to alter the corporate incentives or enhance the capacity of disenfranchised communities to achieve environmental justice. Many

²⁸¹ Anna Driver & Bruce Nichols, *Shale Oil Boom Sends Waste Gas Burn-Off Soaring*, REUTERS, July 25, 2011, <http://www.reuters.com/article/2011/07/25/us-shale-flaring-idUSTRE76O4SU20110725> (noting that flaring of natural gas substantially adds to global warming).

²⁸² See Robert W. Howarth & Anthony Ingraffea, *Should Fracking Stop?*, 477 NATURE 271, 271–75 (2011).

²⁸³ The Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) has decided

that the Ad Hoc Working Group on the Durban Platform for Enhanced Action shall complete its work as early as possible but no later than 2015 in order to adopt this protocol, legal instrument or agreed outcome with legal force at the twenty-first session of the Conference of the Parties and for it to come into effect and be implemented from 2020.

See Conference of the Parties, Nov. 28–Dec. 9, 2011, *Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Action*, ¶ 3, Draft decision -/CP.17 (Dec. 10, 2011), available at <http://unfccc.int/resource/docs/2011/cop17/eng/110.pdf>.

ordinary individuals shy away from the term altogether, not wanting to be seen as anything other than well-meaning, middle-of-the-road, family-oriented Americans. Pitting jobs against health is a no-win proposition. Both are important and not mutually exclusive. Thus, governance plays an important role in ensuring that decision-making is not only not unconstitutionally arbitrary and capricious, but is in fact well-reasoned and based on a sound understanding of the ramifications—economic, societal, and environmental.

Sound decision-making can happen at all levels of governance and is facilitated by checks and balances, both on the part of the public sector and members of the general public. Few members of the general public have the time, inclination, or resources with which to voice their perspectives, unlike their corporate counterparts whose core business mandate often rests upon lowering regulatory requirements and environmental protections. People take to the streets when they feel threatened. During the civil rights era, peoples' taking to the streets raised enough visibility to create a legislative ground swell to enact equality provisions.

This author has written elsewhere supporting the establishment of Middle Eastern transboundary water commissions with which to build trust and enhance water governance.²⁸⁴ This Article is part of a series that looks at environmental good governance and human rights. Ultimately, this author concludes here that there is not a magic scale of governance at which decisions will always be made in an environmentally minded manner. International and national laws have the advantage of being able to protect drinking water across a broad area for many people and create a public health threshold, yet, such protections can be swept away as easily as they can be created—if not more easily. There are certainly individuals at a local level with a stake in ensuring the integrity of local water supplies but without the constitutional support to prevent commerce, in the form of drilling companies, from coming into their local communities and engaging in business. Thus, the public health and environmental integrity measures that should be well-established and whose enforcement should be well funded, should be a cooperative commitment among all governance levels. This can involve clear roles for each level—citizen monitoring and suits, tribal inclusive decision-making, municipal authority to zone residential areas that are free from industry and that can depend upon adequate water supplies, state statutes and environmental regulations that ensure comprehensive environmental and public health impact studies as well as enough boots on the ground

²⁸⁴ See, e.g., Elizabeth Burleson, *Equitable and Reasonable Use of Water in the Euphrates-Tigris River Basin*, 35 ENVTL. L. REP. 10041, 10042 (2005); see also Elizabeth Burleson, *Middle Eastern and North African Hydropolitics: From Eddies of Indecision to Emerging International Law*, 18 GEO. INT'L ENVTL. L. REV. 385, 386 (2006).

to monitor and enforce protection measures, and national drinking water and environmental laws that indeed protect drinking water and ecosystem services.

So where do transboundary water organizations fit into this cooperative mix? Should they play the lead in authorizing energy extraction? Should they receive the revenue derived from leasing fees for drilling? Should they be able to permit drilling in a state that has a moratorium preventing drilling? Should the governors of five states and a representative from the Army Corps of Engineers be able to take a single vote and allow unconventional natural gas extraction in the watershed upon which fifteen million people depend for clean drinking water?²⁸⁵ If not these six, then who? Civil society?²⁸⁶ The legislature? The courts? The EPA? Congress? The President? Who should make standards for drinking water? The Bill McKibben-inspired members of civil society willing to get arrested for protesting at a DRBC meeting that would decide whether hydrofracking would be permitted by the DRBC? Is this optimal public participation? Is it effective? Can it result in nuanced land-use regulation that balances private property rights with public health and environmental integrity?²⁸⁷ Is it worth paying attention when large numbers of people take to the streets? Having the social license to operate is crucial, especially when something as vulnerable as a pipeline carrying highly explosive gas is involved. This is the lesson learned by Shell in Nigeria²⁸⁸—(1) disenfranchised individuals can and will sabotage corporate profits when their family members become sick because their neighborhoods are no longer safe to live in due to air pollution from flaring and water pollution, (2) public participation in decision-making is necessary, and (3) access to justice is important. To achieve these ingredients of environmental justice, governments must establish laws that enhance procedural rights; this would allow for civil society to genuinely achieve informed consent, and thus have a meaningful input on draft legislation and rule-making. Broad standing provisions also provide a check and balance system with which to minimize the buying of politicians by cor-

²⁸⁵ See STATEIMPACT PA., *supra* note 168.

²⁸⁶ See generally VICTORIA B. BJORKLUND, JAMES FISHMAN & DANIEL L. KURTZ, *NEW YORK NONPROFIT LAW AND PRACTICE WITH TAX ANALYSIS* (2d ed. 1997) (providing a legal analysis of non-profit law).

²⁸⁷ See Shelby D. Green, *Reclaiming the Public Domain by Repeal of the Mining Law of 1872*, 6 HOFSTRA PROP. L.J. 85 (1993); see also COMPENDIUM OF LAND USE LAWS FOR SUSTAINABLE DEVELOPMENT (John R. Nolon ed., 2006); JEFFREY MILLER, *CITIZEN SUITS: PRIVATE ENFORCEMENT OF FEDERAL POLLUTION CONTROL LAWS* (1987); Karl S. Coplan, *Ideological Plaintiffs, Administrative Lawmaking, Standing and the Petition Clause*, 61 ME. L. REV. 379 (2009); James May et al., *Environmental Citizens Suits at Thirtysomething: A Celebration and Summit*, 33 ENVTL L. REP. 10721 (2003).

²⁸⁸ See, e.g., *Pipeline Blown up in Niger Delta*, BBC NEWS, May 26, 2008, <http://news.bbc.co.uk/2/hi/africa/7419918.stm>.

porate interests. Safe drinking water and clean air are non-negotiable, and corporations are not real people, yet public interests compete—affordable winter heating sources present a medical necessity as does having adequate funds with which to eat properly. These constraints are clear, if often overlooked. Less clear to the general public are the intricacies of utility rate-making—the ability to raise the cost of natural gas or electricity based on the cost of new infrastructure investment, for instance. Furthermore, the level of fossil fuel subsidization by the public sector also remains opaque, as does the full life-cycle impact of the array of available energy resources.

The United States' NEPA pioneered recognition of procedural rights and, while it has not lived up to its full stature, it remains a useful tool with which to insist that the federal government take stock of environmental impacts before proceeding with projects that impact public resources. Few little NEPA's at the state level have also allowed for reflection periods prior to commencing projects that substantially impact ecosystem services and environmental integrity. The environmental impact assessment requirements pioneered by the United States have spread around the globe and become particularly effective in Europe. This author concludes that the United States could benefit by incorporating the best practices being implemented by the European Union with regard to environmental law generally and the Aarhus Convention in particular.

E. European Union as a Comparative Model for the United States

The Aarhus Convention has codified a human right to a clean environment; the convention grants citizens access to environmental information, participation in decision-making in environmental matters, and judicial redress.²⁸⁹ This convention picks up where the NEPA leaves off by clearly delineating the scope of rights to (1) access to information,²⁹⁰ (2) public participation in decision-making,²⁹¹ and (3) access to justice.²⁹² The body of cases that have developed pursuant to the Aarhus Convention can facilitate energy/water/climate good governance wherever energy use impacts public health and environmental integrity. The United States Congress should require gas companies to file quarterly data reports with a federally and adequately funded clearinghouse of natural gas materials.²⁹³ The Aarhus Convention provides a model with

²⁸⁹ See Convention On Access to Information, Public Participation in Decision-Making and Access to Justice Regarding Environmental Matters, art. 3, June 25, 1998, 38 I.L.M. 517 (1999), available at <http://www.unece.org/env/pp/documents/cep43e.pdf> [hereinafter Aarhus Convention].

²⁹⁰ See *id.* art. 4.

²⁹¹ See *id.* arts. 5–6.

²⁹² See *id.* art. 9.

²⁹³ EPA and local communities could link websites with a single information portal.

which to balance access to information with the administrative cost of compliance.²⁹⁴

Including citizens in environmental protection increases the effectiveness of that protection because people often have a deep interest in, and are affected by, the state of their surrounding environment.²⁹⁵ This rights-based approach can prohibit discrimination on the basis of citizenship, nationality, or domicile. While the Convention is not focused on the private sector, when environmental regulation has been devolved to privatized bodies these entities are covered under the definition of public authorities.²⁹⁶

The RDSGEIS recognizes the lack of a US-based metric to evaluate the environmental ramifications of various chemicals associated with unconventional natural gas extraction. In particular, it notes that the “most significant environmentally conscious hydraulic fracturing operations and regulations to date are likely in the North Sea. Several countries have established criteria that define environmentally beneficial chemicals and utilize models and databases to track chemicals’ overall hazardousness against those criteria.”²⁹⁷

Several international best practices can inform genuine efforts to minimize chemical exposure rates. First, the Oslo-Paris Convention (OSPAR) list of environmentally sound chemicals can assist in minimizing exposure rates.²⁹⁸ Second, the Norwegian Pollution Control Authority oil and gas industry chemical coding approach is capable of doing the same.²⁹⁹ Inclusive decision-making can lead to robust chemical approval lists and lists of banned chemicals based on “low biodegradability; high bioaccumulation potential; high acute toxicity; and detrimental mutagenic or reproductive effects.”³⁰⁰

REACH also provides a best practice, demonstrating regulation of the Registration, Evaluation, Authorization and Restriction of Chemical

²⁹⁴ See Åarhus Convention, *supra* note 289.

²⁹⁵ See *id.*

²⁹⁶ See *id.* art. 2, § 2(b)–(c).

²⁹⁷ NEW YORK RDSGEIS, *supra* note 133, at 9–10.

²⁹⁸ See The Convention for the Protection of the Marine Environment of the North-East Atlantic, Sept. 9, 1992, available at http://www.ospar.org/html_documents/ospar/html/ospar_convention_e_updated_text_2007.pdf; see also OSPAR COMM’N, LIST OF SUBSTANCES OF POSSIBLE CONCERN, http://www.ospar.org/content/content.asp?menu=00950304450153_000000_000000 (last visited Oct. 10, 2012).

²⁹⁹ NORWEGIAN POLLUTION CONTROL AUTH., GUIDELINES TO REGULATIONS RELATING TO CONDUCT OF ACTIVITIES IN THE PETROLEUM ACTIVITIES (THE ACTIVITIES REGULATIONS) § 56(b) (2010); see also CANADA-NEWFOUNDLAND AND LABRADOR OFFSHORE PETROLEUM BOARD, OFFSHORE CHEMICAL SELECTION GUIDELINES FOR DRILLING & PRODUCTION ACTIVITIES ON FRONTIER LANDS (2009), available at <http://www.cnlopb.nl.ca/pdfs/guidelines/ocsg.pdf> (a North American model).

³⁰⁰ JOINT COMMENTS, *supra* note 209, at 87.

use in the European Union.³⁰¹ The European Commission explains that “[m]anufacturers and importers are required to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the European Chemicals Agency”³⁰² The European Chemicals Agency is establishing a robust public database for civil society to find hazard information.³⁰³

Europeans are familiar with difficult natural gas, energy, and security debates given the ongoing discord between Russia and much of the rest of Europe that has resulted in winter home heating fuel insecurity. The European Union seeks to reduce reliance on Russian natural gas supplies, particularly in the wake of Russia-Ukraine pricing conflicts that resulted in supplies being halted to Western Europe in the winters of 2006 and 2009.³⁰⁴ While this has incentivized European exploration of non-Russian energy alternatives, this energy insecurity has not kept Europeans from implementing comprehensive environmental enforcement measures.³⁰⁵

European Union pollution provisions provide broad energy-water governance thresholds.³⁰⁶ The plain language of the Mining Waste Directive 2006/21³⁰⁷ requires coordination with the Water Framework Directive 2000/60.³⁰⁸ The Water Framework Directive provides a best practice upon which other jurisdictions can model water governance.³⁰⁹ Together with the Ground Water Directive, baseline chemical thresholds,³¹⁰ transboundary coordination provisions,³¹¹ and the Drinking

³⁰¹ See Commission Regulation 1907/2006 (O.J.) (L 396) 1, 1 (EC) (entered into force on June 1, 2007, and its provisions are being phased-in over eleven years); see also EUROPEAN COMMISSION, REACH, http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm [hereinafter EUROPEAN COMMISSION, REACH] (“The REACH Regulation places greater responsibility on industry to manage the risks from chemicals and to provide safety information on the substances.”) (last visited Sept. 27, 2012).

³⁰² EUROPEAN COMMISSION, REACH, *supra* note 301.

³⁰³ See *id.*

³⁰⁴ *Russia Shuts Off Gas to Ukraine*, BBC NEWS, Jan., 1 2009, <http://news.bbc.co.uk/2/hi/europe/7806870.stm> (noting that, “[m]uch of the EU’s gas from Russia arrives via Ukraine”).

³⁰⁵ See, e.g., EUROPEAN COMM’N, EMISSIONS TRADING SYSTEM (EU ETS), http://ec.europa.eu/clima/policies/ets/index_en.htm (last visited Oct. 10, 2012).

³⁰⁶ EUROPEAN PARLIAMENT DIRECTORATE-GEN. FOR INTERNAL POLICIES, IMPACTS OF SHALE GAS AND SHALE OIL EXTRACTION ON THE ENVIRONMENT AND ON HUMAN HEALTH 1, 55–57 (2011), available at <http://www.europarl.europa.eu/document/activities/cont/201107/20110715ATT24183/20110715ATT24183EN.pdf>.

³⁰⁷ Council Directive 2006/21, art. 2(1), 2006 O.J. (L 102) 15, 16 (EC).

³⁰⁸ Council Directive 2006/21, art. 5(2)(g), 2006 O.J. (L 102) 15, 22 (EC) (waste management plans are required to include “measures for the prevention of water status deterioration in accordance with Directive 2000/60/EC”); see also Council Directive 2000/60, 2000 (O.J.) (L 327) 1 (EC).

³⁰⁹ See Council Directive 2000/60, art. 1(d), 2000 O.J. (L 327) 1, 5 (EC).

³¹⁰ See Council Directive 2006/118, art. 3(2), 2006 O.J. (L 372) 19, 21 (EC).

³¹¹ See Council Directive 2006/118, art. 3(3), 2006 O.J. (L 372) 19, 21 (EC).

Water Directive,³¹² the Water Framework Directive can address important aspects of natural gas development. Drafters could enhance these provisions to specifically respond to the unanticipated public health and environmental integrity issues that come with hydraulic fracturing. The Drinking Water Directive allows member states to exempt “water intended exclusively for those purposes for which the competent authorities are satisfied that the quality of the water has no influence, either directly or indirectly, on the health of the consumers concerned”³¹³ As a human-based standard, this may not adequately take into account ecosystem services. Even within the context of the human-based approach, this may not protect drinking water, particularly for those relying on wells. This is not solely a hydraulic fracturing issue. It is also a matter of adequately regulating and monitoring such processes as cement casing, flowback, and wastewater disposal. European Union Directive 2003/105/EC addresses large-scale hazardous material accidents,³¹⁴ and the Hazardous Waste Directive (1991/689/EC) likely covers some aspects of unconventional natural gas extraction waste processes.³¹⁵ Yet this Article argues that unconventional extraction wastewater transport, processing, and storage need to be specifically regulated. This can be accomplished by amending existing water and energy directives or by drafting a new unconventional extraction directive.

More recently, the European Union has modeled good governance with strong procedural measures for access to information, public participation, and access to justice. For instance, the Environmental Assessment Directive 85/337 mandates environmental impact assessments for public or private projects with significant environmental effects.³¹⁶

Similarly, member states must disclose transboundary effects to those impacted in as timely a manner as the citizens of the country carrying out the activity learn of the dimensions of the project.³¹⁷ Given the changes in hydraulic fracturing and modern extraction practices in residential areas, it behooves the European Union to reassess the thresholds for the volume of natural gas extraction.³¹⁸

Biodiversity provisions can also help the European Union balance energy production with public health and environmental integrity. For instance, the Habitats Directive 92/43 protects endangered species and

³¹² See Council Directive 98/83, art. 1(2), 1998 O.J. (L. 330), 32, 34 (EC).

³¹³ See Council Directive 98/83, art. 3(2)(a), 1998 O.J. (L. 330), 32, 34 (EC).

³¹⁴ See Council Directive 96/82, art. 1, 2003 O.J. (L. 345), 1, 3 (EC).

³¹⁵ See Council Directive 91/689, art. 1(1), 1991 O.J. (L. 377), 1, 1 (EEC).

³¹⁶ Council Directive 85/337, art. 1(1), 1985 O.J. (L. 337), 1, 3 (EEC).

³¹⁷ Council Directive 85/337, art. 7(1), 1985 O.J. (L. 337), 1, 7 (EEC).

³¹⁸ See EUROPEAN PARLIAMENT DIRECTORATE-GEN FOR INTERNAL POLICIES, *supra* note 306, at 78–79.

the habitats upon which they depend.³¹⁹ While not all natural gas productions will impact endangered species or birds under the Birds Directive,³²⁰ such nature-based provisions are part of the patchwork quilt of existing provisions impacting natural gas production.

European Union climate/energy governance includes the Renewable Energy Directive, Revised Emissions Trading Directive, Geological Storage of Carbon Dioxide Directive, and Effort Sharing Decision that together seek to reduce greenhouse gas emissions by twenty percent by 2020.³²¹ Here, life-cycle analysis is crucial to determine whether the leakage of natural gas, methane being a far more potent greenhouse gas than carbon, is warranted when compared with the life-cycle of other energy options.

As this article goes to press, recent European Union studies have identified climate and health impacts of hydraulic fracturing and clarified that the following directives may not fully cover unconventional natural gas exploration: “Environmental Impact Assessment Directive (2011/92/EU), the Environmental Liability Directive (2004/35/EC), the Mining Waste Directive (2006/21/EC), and the Water Framework Directive (2000/60/EC)”³²² The European Commission has announced that in 2013 the European Union will publish legislative proposals to ensure that environmental law effectively covers shale gas extraction.³²³

The flexibility of European Union directives provides member states with the ability to tailor provisions to distinct geographic, cultural, and other realities, while avoiding a race to the bottom with regard to basic protections. It is fundamental to ensure a sound threshold at the outset for such an approach to achieve “best practice” status. This requires meaningful involvement from a wide range of stakeholders to find consensus regarding what constitutes safe thresholds.

CONCLUSION

Collaborative governance that is genuinely adaptive and cooperative can best fill regulatory gaps. The best available science should guide

³¹⁹ Council Directive 92/43, art. 2(1), 1992 O.J. (L. 206), 32, 34 (EEC).

³²⁰ See Council Directive 2009/147, art. 1(1), 2009 O.J. (L 20), 7, 8 (EC).

³²¹ See Press Release, European Commission, The EU Climate and Energy Package, http://ec.europa.eu/clima/policies/package/index_en.htm (last visited Oct. 18, 2012).

³²² Stephen Gardner, *Drilling European Union to Propose Legislation to Address Risks from Hydraulic Fracturing*, BNA, Sept. 14, 2012, http://news.bna.com/erln/ERLNWB/split_display.adp?fedfid=27995824&vname=ernotallissues&jd=a0d4m7z9g4&split=0 (The study on the climate impact of potential shale gas production in Europe is available at http://ec.europa.eu/clima/policies/eccp/docs/120815_final_report_en.pdf. The study on potential risks for the environment and human health arising from hydrocarbon operations involving hydraulic fracturing in Europe is available at <http://ec.europa.eu/environment/integration/energy/pdf/fracking%20study.pdf>).

³²³ *Id.*

inclusive decision-making, and citizen suits should be authorized to give members of civil society a compliance role that can balance the sway of the energy sector on public sector decision-making.

The right to know which chemicals are likely to enter the drinking supply as a result of unconventional natural gas development has caused the most pronounced public outcry. Prior disclosure of chemicals across the life cycle of natural gas development and wastewater disposal has yet to be integrated into an adequate regulatory safety net for public health and environmental integrity. Civil society is creating the checks and balances requisite to enact such protections in the United States—a legal system susceptible to industry capture of elected officials. Civil society would be able to play this role more effectively with access to information not only on the chemical composition of hydraulic fracturing solutions but also the radioactivity of wastewater flowback and alternatives, ranging from the least toxic fracturing solutions to ways to minimize or eliminate wastewater flowback. Environmental impact studies should analyze these alternatives, providing the public real options with which to balance economic and public health decisions.

Reclassifying floodplains to reflect the genuine risk of flooding has caused less pronounced public outcry. Here, technical expertise is fundamental to informing energy siting decision-making. It makes little sense to base permitting decisions on outdated floodplain maps when establishing regulations to protect drinking water. The Intergovernmental Panel on Climate Change (IPCC) indicates that wet places are receiving increased precipitation and that such places will increasingly need to respond to intense durations of heavy rainfall and flooding.³²⁴ Updating floodplain maps to reflect increased frequency and severity of precipitation can enhance the public sector's capacity to protect public health and welfare.

Transboundary water organizations are in a position to show leadership by enhancing groundwater protection and being stewards of limited freshwater supplies. This requires coordinated analysis on the energy-water nexus—analysis that addresses the challenges of achieving energy/water security as well as balanced domestic water use among stakeholders. Strong provisions for access to information, public participation, and access to justice can facilitate procedural good governance with which to ensure environmental and human health.

³²⁴ A stable climate is a public good, the absence of which will thwart the provision of other public goods such as access to fresh water. The IPCC indicates that “[c]hanges in precipitation patterns and the disappearance of glaciers are projected to significantly affect water availability for human consumption, agriculture and energy generation.” INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007, CLIMATE CHANGE 2007: SYNTHESIS REPORT § 3.3.2 (2007), available at http://www.ipcc.ch/publications_and_data/ar4/syr/en/mains3-3-2.html.

No single layer of government consistently provides optimal public health and environmental integrity protections. At times, international, non-governmental, regional, federal, state, local, and individual players have provided sustainable development leadership. Some technologies and geographic realities may be better suited to a given kind of governance. Regional water-energy-climate collaborative governance may facilitate wave energy success along a coastline. Similarly, watershed management may benefit from regional transboundary commissions. Yet such commissions will not, by definition, be insulated from persuasive and well-financed stakeholders seeking development permits that do not adequately take into account water quality and quantity needs of the watershed. Integrating the work of scholars conducting energy spectrum life-cycle analysis with the work of scholars analyzing best practices in collaborative governance continues to unfold. The national academies and a wide range of public/private studies can further this crucial work. In the context of unconventional natural gas, engineering, geology, innovation, and governance are colliding, and better water-energy-climate coordination can further energy security.

It is crucial that industry provide the funding with which to conduct independent baseline assessments. The national academies should be involved in comprehensive evaluation of natural gas extraction as well as cradle to grave analysis of respective energy options. Hydraulic fracturing, drilling, casement/cement stability, release/leakage of methane and wastewater, and incentivizing green hydraulic fracturing solutions and lowering water intensity of natural gas production are all areas needing further analysis.

Hydraulic fracturing solutions vary from site to site given the range of shale characteristics. People should be able to use information that is put in the public domain that clearly identifies the range of chemicals being used. Buffer zones should be placed around public drinking supplies. Permitting should not get out ahead of enforcement capacity. Industry fees should go towards public sector and independent, ongoing water quality monitoring tests, both before and after industry activity. These tests should be both onsite and downstream. Because all these activities will cost money, proper funding for such initiatives is necessary. Fossil fuel extraction is a very lucrative industry, and it is prudent to tie regulation fees to permitting application processes.

In addition to public sector regulation, corporate responsibility must minimize the toxicity of operations and meaningfully disclose chemical exposure. The private sector can provide leadership by highlighting environmentally sound best practices.

Blowouts are not rare occurrences, and blowout preventers leave much to be desired.³²⁵ Comprehensive regulation that ensures well integrity should be informed by blowouts in Pennsylvania. Inadequate cementing and casing is dangerous and should be taken seriously as unacceptable, whether in a backyard in Pennsylvania, in the Gulf of Mexico, or in the Arctic Ocean. As the energy sector transitions from traditional to unconventional energy exploration/experimentation, safety concerns intensify. Similarly, radioactive waste disposal capacity should predate generation of radioactive waste, whether dealing with concentrated radioactive waste from nuclear power plants or radioactive shale from natural gas wastewater.

Energy security and economic development are real drivers, as are efforts to ensure affordable energy. Yet advances in drilling technology should not be the only deciding factor in the absence of comparative life-cycle analyses across energy options. Transparency can help optimize unconventional natural gas sustainable development. Jurisdictions should analyze whether existing regulatory frameworks are adequate since unconventional extraction is distinct from the conventional extraction for which existing regulations were designed. Innovation and deregulation have enabled unconventional natural gas extraction.

Congress should restore hydraulic fracturing and related activities to federal environmental laws by passing the FRAC Act, closing loopholes, and requiring chemical content disclosure. Genuine buffer zones should be put in place for floodplains, all drinking water sources, and endangered species habitats. The EPA should enforce its prohibition on diesel use in hydraulic fracturing and establish mandatory and frequent monitoring of aquifers and rivers downstream from natural gas production. Permits should not be issued beyond regulatory capacity, and fees for regulatory expenses should be substantial. Liability coverage should be required and should be sufficient to make whole all people and ecosystems negatively impacted when regulations are not met.

Transitioning to environmentally sound energy use that minimizes public health and environmental impacts while contributing to energy security can best be done by looking to best practices throughout the world. Best practices should be researched, published regularly, and included in mandatory employee training. Greenhouse gas vapor control should be mandated and enforced.

One way to re-frame energy use and, by doing so, make energy production more environmentally sound, is to coordinate water and en-

³²⁵ See Latham, *supra* note 20, at 37–38 (noting that “[m]ore than 100 blowout preventer failures at eighty-three deepwater wells were studied, and fifty-seven percent were labeled ‘safety critical failures’” and that there was “one blowout for every 387 wells drilled from 1992 through 2006.”).

ergy discussions. Recently, droughts and floods have compromised energy production.³²⁶ This places water-energy-climate decision-making in the public discourse, irrespective of efforts to discount climate trends for lack of scientific certainty. By definition, scientific certainty will not be achieved. This is why the international community committed to not letting uncertainty stand in the way of addressing climate change in agreeing upon the United Nations Framework Convention on Climate Change.³²⁷

A social license to operate an activity as strategic and volatile as natural gas extraction can be accomplished in combination with a robust environmental and public health framework that balances energy and equity at local, regional, and international levels. Transboundary collaborative governance can help coordinate effective responses to shared energy-climate-water challenges.

³²⁶ See Burleson, *Emerging Law*, *supra* note 201, at 503; N. AM. ELEC. RELIABILITY CORP., 2012 SUMMER RELIABILITY ASSESSMENT (May 2012), available at <http://www.nerc.com/files/2012SRA.pdf>; see also Joe Eaton, *Record Heat, Drought Pose Problems for U.S. Electric Power*, NAT'L GEOGRAPHIC NEWS, Aug. 17, 2012, <http://news.nationalgeographic.com/news/energy/2012/08/120817-record-heat-drought-pose-problems-for-electric-power-grid/>.

³²⁷ See Intergovernmental Negotiating Comm. for a Framework Convention on Climate Change, *United Nations Framework on Climate Change*, art. 3(3), 5th Sess., Annex, U.N. Doc. A/AC.237/18 (Part II)/Add.1 (May 15, 1992) (UNFCCC) (one hundred sixty-five countries ratified the UNFCCC; the convention entered into force March 21, 1994); see also Elizabeth Burleson, *Climate Change Consensus: Emerging International Law*, 34 WM. & MARY ENVTL. L. & POL'Y REV. 543 (2010).