# COMMENT

## ARE THE WEST'S WATER RESOURCES FRACKED? A STUDY ON THE EFFECTS OF FRACKING AND HOW STATES AND LOCALITIES ARE RESPONDING

BY

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*In the early 2000s, the advent of hydraulic fracturing coupled with directional drilling opened up many previously uneconomical oil and natural gas fields to drilling. Many of these fields, however, were in areas directly next to small, quiet communities unaccustomed to the intensity of oil and gas development. Some towns were overwhelmed by the speed and money behind the boom. A few communities fought back with local measures banning the controversial well stimulation technique of hydraulic fracturing in order to protect their water resources. This Comment seeks to examine how these measures fared in the legal challenges filed against them and to help other communities looking to use these measures learn from these fights.*



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## I. INTRODUCTION

Recently, hydraulic fracturing, commonly known as fracking, has gained public notoriety for its potential to both contaminate and consume water resources in increasingly arid western states. Fracking is a process that occurs after a company drills a well but before it begins producing oil or gas. During fracking, an oil and gas company fractures the geologic formation containing the oil or gas with concentrated explosions.[1] After that, the company pumps a proprietary mixture of chemicals and water at high pressure into the formation along with sand to prop open the pore space of the rock and release the oil and gas.[2] Industry's use of this technique, coupled with horizontal drilling, is opening up vast stretches of oil and gas fields and overlying land to development. Because of these two innovations, oil and gas production from unconventional sources—geological formations where oil and gas is locked in tight shale or sandstone formations as opposed to in a large pool—is growing rapidly.[3] According to the Congressional Research Service, "[t]he United States surpassed Russia in 2009 as the world's largest natural gas producer."[4] In June of 2014, the United States became the world's largest producer of oil as well.[5] Because of this expansive growth, conflicts between energy and water are becoming commonplace, particularly in the West, and solutions need to be found to address these conflicts.

The public's focus has been on water quality and contamination concerns, but fracking threatens water quantity as well.[6] This is because "[a] well may be hydraulically fractured up to 100 times throughout its

1 Beth E. Kinne, *The Technology of Oil and Gas Shale Development*, *in* BEYOND THE FRACKING WARS: A GUIDE FOR LAWYERS, PUBLIC OFFICIALS, PLANNERS, AND CITIZENS 3, 10 (Erica Levine Powers & Beth E. Kinne eds., 2013).

2 *Id.*

3 *Id.* at 4; Chad J. Lee & Jill D. Cantway, *Leasing Mineral Rights*, *in* BEYOND THE FRACKING WARS, *supra* note 1, at 41, 41.

4 MICHAEL RATNER & MARY TIEMANN, CONG. RESEARCH SERV., AN OVERVIEW OF UNCONVENTIONAL OIL AND NATURAL GAS: RESOURCES AND FEDERAL ACTIONS 1 (2014).

5 Grant Smith, *U.S. Seen as Biggest Oil Producer After Overtaking Saudi Arabia*, BLOOMBERG, July 4, 2014, http://www.bloomberg.com/news/2014-07-04/u-s-seen-as-biggest-oil-producer-after-overtaking-saudi.html (last visited Feb. 15, 2016).

6 *See* Roger R. Drouin, *As Fracking Booms, Growing Concerns About Wastewater*, YALE ENV'T 360, Feb. 18, 2014, http://e360.yale.edu/feature/as_fracking_booms_growing_concerns_about_wastewater/2740/ (last visited Feb. 15, 2016).

production years, and each round of hydraulic fracturing requires a large amount of fluid."[7] Although the exact quantity of water used depends on the formation, it can take between one to six million gallons of water to fracture a single unconventional oil or gas well.[8] Moreover, because federal laws protecting water resources from fracking are limited and drilling is progressing rapidly, many municipalities and states are implementing a variety of local laws to fill in the gaps to protect their water resources.[9]

As a result, this Comment considers: 1) the impacts of fracking on our water resources; 2) the ways in which local and state governments are addressing this complex issue through ballot measures, ordinances, and zoning restrictions; and 3) recommendations on how to address this issue before our water resources run out. Part II considers fracking as a consumptive use of water. Part III provides an overview of state and federal regulations. Part IV focuses on local regulations and narrows in on specific case studies. Part V discusses the balancing of local and state struggles for regulatory power in a rapidly changing physical landscape. Finally, this Comment concludes with a call for stronger, more comprehensive state regulation of water resources while maintaining a small level of local control.

## II. FRACKING AS A CONSUMPTIVE USE

As noted above, fracking an oil and gas well requires more than just water.[10] During the fracking process, oil and gas operators pump an undisclosed mixture of chemicals combined with water (usually fresh water) down the well to reduce friction, inhibit corrosion, and prevent bacterial growth.[11] Depending on the formation, this mixture can travel down the well to depths of 1,000 to 13,500 feet.[12] When fracking is complete, the mixture that returns to the surface can contain a high concentration of salts and other minerals picked up from the oil and gas formation in addition to the chemicals added.[13] In formations such as the Marcellus Shale (in Pennsylvania, New York, West Virginia, and Ohio) or the Bakken (in North

7 Kevin Patrick & Laurie Stern, *Western Water Law: Differing Approaches to Planning for Unconventional Oil and Gas Development in Colorado, Texas, Oklahoma, and Wyoming*, *in* BEYOND THE FRACKING WARS, *supra* note 1, at 129, 130.

8 *Id.*

9 Bruce M. Kramer, *Foreword*, *in* BEYOND THE FRACKING WARS, *supra* note 1, at xv, xviii–xix.

10 Kinne, *supra* note 1, at 10.

11 Lisa Wozniak et al., *Fractured: Hydraulic Fracturing and the Environmental Response in Michigan in* BEYOND THE FRACKING WARS, *supra* note 1, at 175, 181 (stating that undisclosed chemicals mixed with water during fracking are often treated as trade secrets); Rachael Rawlins, *Planning for Fracking on the Barnett Shale: Soil and Water Contamination Concerns, and the Role of Local Government*, 44 ENVTL. L. 135, 138 (2014) (explaining that in fracking, additives to water reduce friction, inhibit corrosion, and stop bacterial growth).

12 U.S. DEP'T OF ENERGY, ENVIRONMENTAL IMPACTS OF UNCONVENTIONAL NATURAL GAS DEVELOPMENT AND PRODUCTION, 79–82 (2014), *available at* http://www.netl.doe.gov/File%20Library/Research/Oil-Gas/publications/NG_Literature_Review3_Post.pdf.

13 Kinne, *supra* note 1, at 11.

Dakota and Montana), radioactive materials may also return with the water.[14] Either way, the wastewater that results from fracking is difficult to treat and reuse and is frequently lost to the water system.

On the water quantity front, fracking an oil and gas well can require between one to six million gallons of water, and a well may be fracked up to 100 times throughout its lifespan.[15] Industry argues, however, that the amount of water used for fracking is miniscule compared to that of other industries.[16] According to a United States Geological Survey (USGS) study from 2005, fracking only comprises a small percentage of the total water use in the United States—less than 1%.[17] Although this figure may assuage some fear, there are three concerns with it. First, this figure is from 2005 at the beginning of the oil and gas boom,[18] and as a result, it may be artificially low. Second, the total amount of water used for fracking is highly speculative because many states do not require tracking of this figure, and water is sometimes transported across state lines.[19] Finally, both water used for agriculture (comprising 31% of total water use in the nation) and thermoelectric power generation (49%) are uses with high return flows.[20] Water used for fracking is arguably a consumptive use because almost all of the water used is reinjected into deep, unusable aquifers due to its contamination and is essentially lost to the system.

USGS defines consumptive use as "water that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or *otherwise removed from an immediate water environment*."[21] It is this last type of consumptive use that is most relevant in the context of fracking. Much of the water used for fracking is unavailable for reuse due to a variety of reasons. First, companies drilling and fracking these wells cannot recover all of the water from the geological formation.[22] A recent study of the Pennsylvania portion of the Marcellus Shale found that only six percent of the fluids injected (including chemicals and water) returned to the surface

14 EVAN HANSEN ET AL., WATER RESOURCE REPORTING AND WATER FOOTPRINT FROM MARCELLUS SHALE DEVELOPMENT IN WEST VIRGINIA AND PENNSYLVANIA 8 (2013) *available at* http://www.downstreamstrategies.com/documents/reports_publication/marcellus_wv_pa.pdf; Alex Nussbaum, *Radioactive Waste Booms With Fracking as New Rules Mulled*, BLOOMBERG, Apr. 16, 2014, http://www.bloomberg.com/news/print/2014-04-15/radioactive-waste-booms-with-oil-as-new-rules-mulled.html (last visited Feb. 15, 2016).

15 Patrick & Stern, *supra* note 7, at 130.

16 W. Energy Alliance, *Water: Industry Protects Water*, http://www.westernenergyalliance.org/knowledge-center/water (last visited Feb. 15, 2016).

17 Patrick & Stern, *supra* note 7, at 130.

18 U.S. DEP'T OF ENERGY, *supra* note 12, at 1, 10.

19 U.S. GOV'T ACCOUNTABILITY OFFICE, ENERGY-WATER NEXUS: INFORMATION ON THE QUANTITY, QUALITY, AND MANAGEMENT OF WATER PRODUCED DURING OIL AND GAS PRODUCTION 10, 23 (2012), *available at* http://www.gao.gov/assets/590/587522.pdf.

20 Patrick & Stern, *supra* note 7, at 130; Timothy E. Link et al., *State of United States' Water*, *in* WATER RESOURCES OF NORTH AMERICA, at 127, 170 (Asit K. Biswas ed., 2003).

21 U.S. GEOLOGICAL SURVEY, CONSUMPTIVE WATER USE IN THE GREAT LAKES BASIN (2008), *available at* http://pubs.usgs.gov/fs/2008/3032/pdf/fs2008-3032.pdf (emphasis added).

22 U.S. DEP'T OF ENERGY, *supra* note 12, at 93 (showing that no government studies indicate complete return of injected materials).

after fracking.[23] In general, wastewater return flows vary greatly by formation.[24] Second, even if an oil and gas company recovers some water, it is frequently so contaminated with chemicals and brine that it cannot be cost-effectively treated to allow for additional uses.[25] Finally, it is cheaper for the industry to dispose of produced water through underground injection wells permitted by the state or the Environmental Protection Agency (EPA) rather than treat it for reuse.[26] The Government Accountability Office estimates that "[o]ver 90 percent of the water produced during oil and gas operations is managed through underground injection practices."[27]

Compounding the issue of the consumptive nature of fracking is the severe lack of knowledge as to the actual amounts of water used during the drilling and fracking. EPA estimates that water use for fracking amounts to between "70 and 140 billion gallons of water annually."[28] In contrast, the Department of Energy notes that, "[p]roduced water [water recovered after fracking] is by far the largest volume byproduct or waste stream associated with oil and gas exploration and production. Approximately 21 billion bbl (barrels; 1 bbl = 42 U.S. gallons) of produced water are generated each year in the United States from nearly a million wells."[29] A quick calculation shows that 21 billion barrels equals 882 billion gallons of water. It is alarming that our regulatory agencies do not know more about the amount of water used.

Finally, fracking is occurring in locations facing water shortages from drought and rapid population growth.[30] According to a new report from Ceres, a nonprofit that studies water scarcity and climate change, "nearly half of the wells hydraulically fractured since 2011 were in regions with high or extremely high water stress. . . . Extremely high water stress . . . means over 80 percent of available surface and groundwater is already allocated for municipal, industrial and agricultural uses."[31] Moreover, oil and gas wells are usually concentrated in a few counties, and "water use for hydraulic fracturing in these regions often exceed[s] annual water use by local residents."[32] Industrial use of water for fracking has the potential to change the landscape of the West due to its consumptive nature, a lack of knowledge as to how much water is actually used and lost during the process, and increasing demands on western water supplies from drought and population growth.

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23 HANSEN ET AL., *supra* note 14, at 7.

24 U.S. DEP'T OF ENERGY, *supra* note 12, at 94.

25 U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 19, at 20.

26 *Id.* at 14.

27 *Id.* at 15.

28 Patrick & Stern, *supra* note 7, at 131.

29 National Energy Technology Laboratory, *Water Issues Dominate Oil and Gas Production* 1, E&P FOCUS, Fall 2013, *available at* http://www.netl.doe.gov/file%20library/research/oil-gas/epnews-2013-fall.pdf.

30 *See generally* MONIKA FREYMAN, CERES, HYDRAULIC FRACTURING AND WATER STRESS: WATER DEMAND BY THE NUMBERS 5, 15 (2014), *available at* http://www.ceres.org/resources/reports/hydraulic-fracturing-water-stress-water-demand-by-the-numbers/view (highlighting the overlay of drought and traditional water use with the demand for water for fracking).

31 *Id.*

32 *Id.* at 7.

## III. THE REGULATORY FRAMEWORK FOR FRACKING

The issues surrounding fracking increase in complexity when considering the myriad regulatory frameworks that apply. This complexity is mainly because the bulk of regulation falls to the states.[33] On top of this, due to the 2005 Energy Policy Act,[34] there is little or no oversight of fracking at the federal level because it is exempt from a number of federal laws.[35] Regulation occurs at the local level as well. Municipalities and counties recently began passing zoning ordinances and ballot measures banning fracking outright, instituting moratoria, or implementing general oil and gas regulations.[36] Caught in the middle of this regulatory mess is a resource not constrained by state, federal, or local boundaries—water. A consistent regulatory approach is needed to address this issue, but the question remains as to who should lead the charge—states, the federal government, or localities?

### *A. State Oil and Gas Regulations*

State regulations cover almost every aspect of oil and gas development including fracking. These laws regulate, among other things, water rights, chemical disclosure, well integrity standards, baseline water monitoring and testing, and wastewater disposal issues.[37] All states with oil and gas wells have some sort of regulatory system to implement these standards.[38] However, no state in the West has regulations in place to restrict the amount of water withdrawn specifically for fracking.[39] On top of this, state laws are rapidly changing. At least sixteen states have updated or are currently updating their laws to address fracking and other concerns related to oil and gas development.[40] State regulation is a complex, moving target.

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33 Sorell E. Negro, *The Thirst of Fracking: Regulating to Protect the Linchpin of the Natural Gas Boom*, 77 ALB. L. REV. 725, 728 (2014).

34 Energy Policy Act of 2005, Pub. L. No. 109–58, 119 Stat. 594, 694 (2005).

35 *See, e.g.*, *id.* § 322 (amending the Safe Drinking Water Act, 42 U.S.C. §300h(d)(1)(B), to provide that the term "underground injection . . . excludes the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities").

36 Julie Cart, *New Mexico County First in Nation to Ban Fracking to Safeguard Water*, L.A. TIMES, May 28, 2013, http://articles.latimes.com/2013/may/28/local/la-me-fracking-ban-20130529 (last visited Feb. 15, 2016).

37 RATNER & TIEMANN, *supra* note 4, at 11–12.

38 RICHARDSON ET AL., THE STATE OF STATE SHALE REGULATION: STATE-BY-STATE TABLES app. at 5 (2013), *available at* http://www.rff.org/files/document/file/RFF-Rpt-StateofStateRegs_StateTables_0.pdf (analyzing each state's regulatory elements related to shale gas development activities).

39 RICHARDSON ET AL., THE STATE OF STATE SHALE REGULATION, 40 (2013), *available at* http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-Rpt-StateofStateRegs_Report.pdf.

40 RATNER & TIEMANN, *supra* note 4, at 11 ("Alabama, Alaska, Arkansas, California, Colorado, Indiana, Michigan, Montana, North Dakota, New Mexico, Ohio, Pennsylvania, Texas, Utah, West Virginia, and Wyoming are among the states that in recent years have revised oil and gas laws and/or rules that address unconventional oil and gas development and hydraulic fracturing specifically.").

In terms of water quantity, depending on availability and location, oil and gas drillers use both surface water and groundwater sources for fracking.[41] To meet their water needs, oil and gas companies have to navigate state water systems, which vary from state to state, apply for permits to use the water, or find a source of water to lease or buy.[42] Industry commonly buys water from municipalities.[43] Such purchases may require a change of use application, but in many cases, this is the easiest way for companies to meet their water needs.[44] Should this approach fail, every state in the country has some sort of water rights system to address appropriation of surface water resources and some states have systems for allocating groundwater resources.[45] But, obtaining water also assumes that states know exactly how much water is available and how much water fracking will use. As of 2013, fourteen states did not require records of the amount of water used during oil and gas operations.[46] This includes key oil and gas producing states such as Montana, Wyoming, and Utah.[47]

In the West, the most common regulatory regime for surface water is prior appropriations.[48] For groundwater, the regulatory system varies between states. For example, Texas, the biggest producer of oil and gas in the United States,[49] uses regulated riparianism for surface water, with grants to historical Spanish and Mexican water rights, and a pure rule of capture for groundwater.[50] Most states did not design their existing water rights systems for the advent of unconventional drilling, however, and need to update their systems to fully address this issue.

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41 *See, e.g.*, North Dakota State Water Comm'n, *Facts about North Dakota Fracking and Water Use* 2–4 (2014), *available at* http://www.swc.nd.gov/pdfs/fracking_water_use.pdf.

42 Patrick & Stern, *supra* note 7, at 132.

43 *Id.*

44 *See id.*

45 Generally, eastern states regulate surface water based on riparianism, while western states use the doctrine of prior appropriation. *See* Ryan Rowberry, *Drinking from the Same Cup: Federal Reserved Water Rights and National Parks in the Eastern United States*, 29 GA. ST. U. L. REV. 987, 988 (2013) (noting that with regard to surface water rights, "unlike western states that typically follow a prior appropriation water regime, eastern states generally adhere to a riparian water law regime"); Joseph W. Dellapenna, *The Law of Water Allocation in the Southeastern States at the Opening of the Twenty-First Century*, 25 U. ARK. LITTLE ROCK L. REV. 9, 45 (2002) ("Legislatures in many, but not all, of the western states have enacted statutes creating appropriative rights systems for the state's groundwater.").

46 RICHARDSON ET AL., THE STATE OF STATE SHALE REGULATION: STATE-BY-STATE TABLES, *supra* note 38, at 58 (providing a map indicating which states do and do not require wastewater tracking).

47 *Id.* (showing in map 16 that Montana, Wyoming, and Utah do not require fracking wastewater tracking).

48 Patrick & Stern, *supra* note 7, at 131–32.

49 Energy Info. Admin., *Crude Oil Production by State*, http://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbbl_m.htm (last visited Feb. 15, 2016); *see also* Energy Info. Admin., *Which States Consume and Produce the Most Natural Gas?* http://www.eia.gov/tools/faqs/faq.cfm?id=46&t=8 (last visited Feb. 15, 2016).

50 Robert A. McCleskey, *Maybe Oil and Water Should Mix—At Least in Texas Law: An Analysis of Current Problems with Texas Ground Water Law and How Established Oil and Gas Law Could Provide Appropriate Solutions*, 1 TEX. WESLEYAN L. REV. 207, 211–12 (1994).

On the water quality front, as of 2015, twenty-seven states require some type of fracking fluid disclosure either to the public or the regulating agency.[51] Moreover, ten states have gone beyond chemical disclosure to address water contamination concerns by requiring baseline water testing and monitoring.[52] Finally, there are state regulations that focus on water contamination issues due to well casing failures or surface spills; twenty-nine states have some sort of casing and cementing requirements.[53] However, fourteen states with current or potential oil and gas fracturing operations do not require tracking of wastewater en route to disposal wells, and eight do not require wastewater pit liners.[54]

### *B. Federal Oil and Gas Regulations*

Federal statutes and regulations fall short of protecting water resources from fracking. Although federal agencies regulate air, surface water, and wildlife through the Clean Air Act,[55] the Clean Water Act,[56] and the Endangered Species Act[57] respectively, there are major regulatory gaps in other key environmental areas. The Energy Policy Act of 2005 exempted fracking from seven major federal laws including the Safe Drinking Water Act (SDWA),[58] which regulates groundwater.[59] There have been efforts in

51 *See* RATNER & TIEMANN, *supra* note 4, at 12.

52 U.S. DEP'T OF ENERGY, *supra* note 12, at 32. As of 2013 Colorado, Illinois, Nebraska, New York, North Dakota, Ohio, Oklahoma, Virginia, and West Virginia all required predrilling water well testing. *Id.* Nevada became the tenth state in August of 2014, when the Nevada Commission on Mineral Resources promulgated and adopted rules requiring baseline testing of up to four water wells within a one-mile radius of the proposed oil or gas well. William H. Carlile, *Water Well Sampling Required in Rules on Fracking Approved by State Commission*, 45 ENV'T REP. 2584, 2584–85 (2014).

53 U.S. DEP'T OF ENERGY, *supra* note 12, at 33–34. Included are Alabama, Arkansas, California, Colorado, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Mississippi, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Utah, West Virginia, and Wyoming. *Id.*

54 *Id.* at 35. The states that do not track wastewater are California, Georgia, Indiana, Maryland, Mississippi, Montana, New Jersey, North Carolina, South Dakota, Tennessee, Utah, Vermont, Virginia, and Wyoming. *Id.* Generally wastewater tracking includes "the names of the operator and transporter, the date the wastewater was picked up, the location at which it was picked up, the location of the disposal facility or destination of the shipment, the type of fluid being transported, the volume, and how it is being disposed of." RICHARDSON ET AL., THE STATE OF STATE SHALE REGULATION: STATE-BY-STATE TABLES, *supra* note 38, at 57. But, this differs by state. *Id.* The states that do not have pit liner requirements are California, Indiana, Maryland, New Jersey, North Carolina, Ohio, Texas, and Vermont. U.S. DEP'T OF ENERGY, *supra* note 12, at 35.

55 42 U.S.C. §§ 7401–7671q (2012).

56 Federal Water Pollution Act, 33 U.S.C. §§ 1251–1387 (2012).

57 Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2012).

58 42 U.S.C. § 300f–300j (2012).

59 *See* 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, 913–14 (2011). Note that the SDWA regulates fracking if diesel fluids are used. 42 U.S.C. § 300h(d) (2012). Also, the

Congress, through proposed legislation such as the Fracturing Responsibility and Awareness of Chemicals Act of 2013 (FRAC Act),[60] to rescind this exemption, but they have not made much progress.[61] Instead, federal agencies have responded to citizens' concerns with a multitude of studies and a few regulations.[62] These efforts include EPA regulation of oil and gas well emissions and an EPA study on the impacts of fracking on drinking water.[63] They also include rules regulating chemical disclosure and well integrity for federal minerals from the Bureau of Land Management.[64] None of the proposed regulations, however, address water consumption for fracking directly.

There are good reasons to consider federal solutions to the problem of fracking since recoverable oil and gas resources are present in almost every state and improvements in drilling technology may expand the list of impacted states.[65] Unfortunately, it seems unlikely that Congress will reach a consensus on how to address this issue fast enough to remedy the major impacts of development on water supplies. In fact, in light of the recent election of a Republican majority in the Senate as well as in the House, there will likely be a push for less regulation overall.[66] Besides, states and localities cannot wait for federal action while their water resources are threatened. Fracking has and will continue at a rapid pace as long as demand remains steady. Therefore, this Comment will focus on regulatory possibilities for state and local governments.

## IV. LOCAL BANS, MORATORIA, AND OTHER APPROACHES TO ADDRESS FRACKING

Interestingly, but perhaps not surprisingly, localities are a hotbed of regulation on the issue of fracking. Many cities, towns, and counties are reacting to the impacts from increased oil and gas development by swiftly passing zoning ordinances and ballot measures banning or regulating fracking or instituting moratoria. As of December 2014, over 400 local governments had attempted some form of fracking ban, moratorium, or

SDWA requires implementation of the Underground Injection Control program, which regulates the disposal of fracking wastewater. *Id.* § 300h-1(a).

60 H.R. 1921, 113th Cong. (2013); S. 1135, 113th Cong. (2013).

61 RATNER & TIEMANN, *supra* note 4, at 20–21.

62 *Id.* at 15.

63 *See, e.g.*, Oil and Natural Gas Sector: Emission Standards for New and Modified Sources, 80 Fed. Reg. 56,593, 56,594 (Sept. 18, 2015) (proposing new regulations for regulating volatile organic compounds at well sites); U.S. ENVTL. PROT. AGENCY, ASSESSMENT OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING FOR OIL AND GAS ON DRINKING WATER RESOURCES xx (2015).

64 *Id.* at 14–19.

65 *Review of Emerging Resources: U.S. Shale Gas and Shale Oil Plays*, U.S. ENERGY INFO. ADMIN., 6–7 (July 2011), *available at* http://www.eia.gov/analysis/studies/usshalegas/pdf/usshaleplays.pdf.

66 *We Believe in America: Republican Platform*, REPUBLICAN NAT'L CONVENTION 1 (2012), *available at* https://prod-static-ngop-pbl.s3.amazonaws.com/docs/2012GOPPlatform.pdf.

restriction.[67] Surprisingly, the wave of local activism originated in Pittsburgh, Pennsylvania when the city banned fracking after an oil and gas company leased minerals underneath a city cemetery.[68] A number of eastern cities followed suit until the issue spread west with a moratorium in Las Vegas, New Mexico in 2012.[69] There, the city passed an ordinance to "protect its water supply from drilling contamination."[70] This was the start of a wave of local control over fracking throughout the entire West. Although the substance of each law varies, almost all mention water as a specific concern and see banning or slowing fracking as a way to protect local water resources.[71] An in-depth case study on how these laws are faring follows below.

### *A. New York*

In *Wallach v. Town of Dryden*,[72] the Court of Appeals of New York considered a challenge to a city ordinance that completely banned oil and gas activities, including fracking, within the city limits of Dryden, New York.[73] The city also attempted to invalidate state and federal oil and gas permits within city limits.[74] The Supreme Court of New York (the trial court) granted summary judgment for the city on the ban of fracking but rejected the provision invalidating state and federal permits.[75] The Court of Appeals of New York affirmed the lower court decision, noting that state oil and gas laws did not preempt local zoning powers.[76] More specifically, the court emphasized that New York had long recognized the power of municipalities to regulate land use as long as the local laws passed did not conflict directly with state law.[77] The court noted further that the plain language of the preemption clause in the state oil and gas statute was "most naturally read as preempting only local laws that purport to regulate the *actual operations of oil and gas activities, not zoning ordinances that restrict or prohibit certain land uses* within town boundaries."[78] Because the ordinance did not

67 Andrew Ba Tran, *Where Communities Have Banned Fracking*, BOSTON GLOBE, Dec. 18, 2014, https://www.bostonglobe.com/news/nation/2014/12/18/where-communities-have-banned-fracking/05bzzqiCxBY2L5bE6Ph5iK/story.html (last visited Feb. 15, 2016).

68 Manny Fernandez, *Drilling for Gas Under Cemeteries Raises Concerns*, N.Y. TIMES, July 8, 2012, http://www.nytimes.com/2012/07/09/us/drilling-for-natural-gas-under-cemeteries-raises-concerns.html (last visited Feb. 15, 2016).

69 LAS VEGAS, N.M., OFFICE OF THE MAYOR, EXECUTIVE ORDER 2012-04 (2012), *available at* https://www.foodandwaterwatch.org/sites/default/files/frack_actions_lasvegasnm.pdf.

70 *Id.*

71 *See generally* Shaun A. Goho, *Municipalities and Hydraulic Fracturing: Trends in State Preemption*, PLANNING & ENVTL. L., July 2012, at 3–4.

72 16 N.E.3d 1188 (N.Y. 2014).

73 *Id.* at 1192.

74 *Id.*

75 *Id.* at 1193.

76 *Id.* at 1198.

77 *Id.* at 1194.

78 *Id.* at 1197 (emphasis added).

directly conflict with the supersession clause in the state oil and gas act, state law did not preempt it.[79]

Although the decision in *Town of Dryden* is revolutionary, it may not extend beyond the state of New York for a few reasons. First, New York is a "home rule" state, and the New York Constitution gives broad powers to municipalities to enact ordinances for the "protection and enhancement of [their] physical and visual environment," as long as these ordinances do not conflict with state law.[80] "Home rule" states usually grant localities various powers over local issues.[81] However, these powers vary from state to state, and the result in New York may not become the norm. Second, the Court of Appeals based its decision partially on a previous decision, *Matter of Frew Run Gravel Products v. Town of Carroll*,[82] which set a strong precedent allowing governance of land use through ordinances as long as municipalities avoided regulating specific mining procedures.[83] Both of these features (home rule and strong precedent) would likely have to be present to extend this decision's reasoning to other states. Regardless, the decision in *Town of Dryden* shows the hidden potential of zoning power to curb fracking and protect water quantity and quality on a local level should the right regulatory framework be in place.

### *B. Colorado*

Activists in the West are trying similar approaches to the one seen in *Town of Dryden*. In 2012, the Boulder County Commissioners approved a one year moratorium on applications for local oil and gas permits governed by county land use laws.[84] The Commissioners subsequently voted to extend the moratorium until July 1, 2018.[85] The purpose of the moratorium is to allow the Commission to update regulations governing oil and gas development activities.[86] During the moratorium, some municipalities have taken the issue into their own hands. Specifically, Longmont, a city within Boulder County, passed a voter initiative in 2012 that banned fracking within the city limits by amending the city's charter.[87] Industry challenged this ban,

79 *Id.*

80 *Id.* at 1194.

81 Kenneth E. Vanlandingham, *Municipal Home Rule in the United States*, 10 WM. & MARY L. REV. 269, 280 (1968).

82 518 N.E.2d 920 (N.Y. 1987).

83 *Town of Dryden*, 16 N.E.3d at 1195.

84 Boulder County, Colorado, *Oil and Gas Development*, http://www.bouldercounty.org/dept/landuse/pages/oilgas.aspx (last visited Feb. 15, 2016).

85 *Id.*

86 Res. 2012-16, 2012 Cnty. Comm'rs, (Boulder County, Colo. Feb. 2, 2012) *available at* http://www.bouldercounty.org/apps/newsroom/articlefiles/2986-Resolution%202012-16.pdf.

87 Tripp Baltz, *State Law Preempts Colorado City's Ban on Fracking, Waste Disposal, Judge Rules,* July 25, 2014, http://www.bna.com/state-law-preempts-n17179892912/ (last visited Feb. 15, 2016).

and a similar ban passed in Fort Collins, in two cases: *Colorado Oil and Gas Association v. Fort Collins*[88] and *Colorado Oil and Gas Ass'n v. Longmont*.[89]

In *Longmont*, the district court ruled that state law preempts a ban on fracking and a ban on storage and disposal of fracking fluids.[90] The district court relied on a four-factor preemption analysis from a previous decision rejecting a drilling ban in Greeley, Colorado to determine that state law preempted the Longmont ban.[91] In particular, the court highlighted the first factor, which looked at the need for statewide uniformity, and decided this factor weighed against the ban.[92] More specifically, the court decided that because the issue at hand was a mixed matter of local and state concern, the local interest should yield to the state interest.[93]

A month later, another district court judge overturned the five-year fracking moratorium passed by voter initiative in Fort Collins in 2013.[94] The situation in Fort Collins differs from the one in Longmont in one key respect: the city had already signed an operator agreement with an oil and gas company, Prospect Energy, allowing fracking within city limits, and the moratorium created an "operational conflict between what Prospect Energy contracted for, as permitted by state law, and what the five-year ban prohibits."[95] However, even if the city had not entered into an operating agreement, the *Fort Collins* court also found that the Colorado Oil and Gas Conservation Act[96] preempted the Fort Collins moratorium, because the local ban impeded a significant state interest in oil and gas production.[97] As shown by both a quick comparison of *Town of Dryden* and the two Colorado decisions, the potential for local regulation of fracking depends heavily on existing case law and statutes in place. Localities attempting to replicate the efforts seen in New York and Colorado will find it hard to evince a clear path forward.

88 No. 13CV31385 (Dist. Ct. Colo. Aug. 7, 2014), *available at* http://www.scribd.com/doc/236186728/Judge-overturns-Fort-Collins-fracking-moratorium.

89 No. 13CV63 (Dist. Ct. Colo. July 24, 2014), *available at* https://www.courts.state.co.us/userfiles/file/Court_Probation/20th_Judicial_District/Cases_of_Interest/13CV63%20Order%20Granting%20Motions%20for%20Summary%20Judgment.pdf.

90 *Id.* at 16.

91 *Id.* at 11, 13.

92 *Id.* at 11.

93 *Id.* at 13, 16.

94 Colo. Oil & Gas Ass'n v. Fort Collins, No. 13CV31385 (Dist. Ct. Colo. Aug. 7, 2014), *available at* http://www.scribd.com/doc/236186728/Judge-overturns-Fort-Collins-fracking-moratorium; Ryan Maye Handy, *Judge Overturns Fort Collins Fracking Moratorium*, COLORADOAN, Aug. 7, 2014, http://www.coloradoan.com/story/news/local/2014/08/07/judge-overturns-fort-collins-fracking-moratorium/13743031 (last visited Feb. 15, 2016).

95 *Fort Collins*, No. 13CV31385, at 2, 8–9.

96 COLO. REV. STAT. §§ 34-60-101 to 34-60-130 (2015).

97 *Fort Collins*, No. 13CV31385, at 8–9.

### *C. Pennsylvania*

The Pennsylvania Supreme Court's decision in *Robinson Township v. Pennsylvania*[98] further highlights these differences and may be one of the best illustrations of the local–state struggle for regulatory power over the issue of fracking.[99] There, the Pennsylvania Legislature passed sweeping amendments in 2012 to the Pennsylvania Oil and Gas Act[100] in a measure called Act 13.[101] Interestingly, the Legislature passed these amendments partially in reaction to a decision by the Pennsylvania Supreme Court upholding local zoning power over oil and gas development.[102] The amendments to the Act included, among other requirements, a prohibition on any local regulation of oil and gas, and a requirement for "uniformity among local zoning ordinances with respect to the development of oil and gas resources."[103] A month after the law passed, citizens and municipalities challenged it, claiming it violated the Pennsylvania constitution.[104] An en banc panel of the Commonwealth Court held the amendments to the Act unconstitutional in part, and enjoined application of the provisions requiring uniformity of local oil and gas regulations.[105] Both parties cross-appealed to the Pennsylvania Supreme Court.[106] The Pennsylvania Supreme Court's decision, however, surprised everyone.

There, the court relied on the public trust language in Pennsylvania's state constitution to throw out the sections in Act 13 requiring state law preemption of local zoning rules and requiring local zoning ordinances to allow oil and gas in all zoning areas.[107] The Environmental Rights Amendment in Pennsylvania's constitution declares: "The people have a right to clean air, pure water, and . . . the Commonwealth shall conserve and maintain them for the benefit of all the people."[108] The court emphasized that since the zoning sections of Act 13 commanded municipalities to ignore their public trust requirements mandated by the state constitution, "the General Assembly transgressed its delegated police powers which . . . are . . . limited by constitutional commands, including the Environmental Rights Amendment."[109] Simply put, the Pennsylvania legislature could not preempt the constitutional trust duty of localities to protect the environment.

Despite another win for localities with this unique decision, courts are unlikely to replicate this approach in other states. First, the court in

98 83 A.3d 901 (Pa. 2013).

99 *Id.* at 913–14.

100 58 PA. CONS. STAT. §§ 3201–3274 (2015).

101 *Robinson Township*, 83 A.3d at 913.

102 *See id.* at 941; *see also* Huntley & Huntley v. Borough Council of Borough of Oakmont, 964 A.2d 855, 855 (Pa. 2009).

103 *Robinson Township*, 83 A.3d at 915.

104 *Id.*

105 *Id.* at 916.

106 *Id.* at 913, 916.

107 *Id.* at 913.

108 PA. CONST. art. I, § 27.

109 *Robinson Township*, 83 A.3d at 978.

*Robinson Township* invoked the public trust doctrine sua sponte.[110] Indeed, public trust doctrine scholars have acknowledged that the doctrine "may rely too heavily on judicial goodwill toward the environment rather than a mandatory procedure."[111] Second, although twenty-nine states have constitutional public trust provisions,[112] many of these provisions are limited to protecting navigable waters and do not apply to groundwater and other important surface waters which may be affected by fracking.[113] Also, a significant number of states' public trust doctrines are statutory.[114] As a result, state legislatures may have the power to amend them to accommodate oil and gas regulations. Each state has a unique common law and public trust doctrine framework.[115] Therefore, determining if the public trust doctrine will support local regulation of oil and gas is unpredictable.

## V. WHAT IS THE BEST WAY TO REGULATE WATER USE FOR FRACKING?

As shown by the information above, there are a myriad of ways to address the problems associated with fracking and water. The main approaches include local control of fracking through zoning laws or ballot measures and state control via legislation or existing frameworks. The benefits of local regulations are that regulators can tailor them to reflect site-specific community concerns; however, these regulations are not comprehensive. State-level regulations, in contrast, are comprehensive but cannot address site-specific concerns such as variances in water resources. Regulators must strike a balance between state and local regulations in order to fully address the impacts of fracking on our nation's water resources.

### *A. The Weaknesses of Local Control*

There are four main reasons why local control, in the form of zoning ordinances or ballot measures, may not be the best approach. First, banning fracking in one locality could shift the focus onto another locality that does not have the political willpower or regulatory structure to implement a ban. This could skew the impacts of drilling and strain the water resources in the particular locality, as fracking water use on the local level can be extremely

110 *Id.* at 942.

111 ALEXANDRA B. KLASS & LING-YEE HUANG, CTR. FOR PROGRESSIVE REFORM, RESTORING THE TRUST: WATER RESOURCES AND THE PUBLIC TRUST DOCTRINE, A MANUAL FOR ADVOCATES 1, 17 (2009), *available at* http://www.progressivereform.org/articles/CPR_Public_Trust_Doctrine_Manual.pdf.

112 CTR. FOR PROGRESSIVE REFORM, RESTORING THE TRUST: AN INDEX OF STATE CONSTITUTIONAL AND STATUTORY PROVISIONS AND CASES ON WATER RESOURCES AND THE PUBLIC TRUST DOCTRINE 5–21 (2009), *available at* http://www.progressivereform.org/articles/PubTrust_State_table_2009.pdf (providing the legal sources of state public trust doctrines).

113 *See id.*; KLASS & HUANG, *supra* note 111, at 6.

114 CTR. FOR PROGRESSIVE REFORM, *supra* note 112, at 5–21.

115 KLASS & HUANG, *supra* note 111, at 7.

intense.[116] For example, in Johnson County, Texas, fracking water use makes up twenty-nine percent of the county's total water use.[117] Second, the power of local zoning regulation is limited. Most of the local zoning regulations passed by municipalities are predicated on land use control. In *Town of Dryden*, this focus on land use control was one of the main reasons the court held that the ordinance passed by the city avoided preemption.[118] It is unclear if localities could pass a zoning ordinance requiring specific water conservation measures and still be within their zoning powers. On top of this, if industry has already purchased mineral rights in the area, a third issue with local control is that there could be potential takings issues should local regulations ban development.[119]

Finally, the legality of local regulation largely depends on state common law and therefore varies from state to state. The decision in *Longmont*, for example, was informed by previous Colorado Supreme Court decisions rejecting local zoning ordinances that regulated natural resource extraction activities.[120] These previous decisions identified a significant state interest in the efficient and fair use of oil and gas resources, and created a common law rule that favored uniform statewide oil and gas regulations.[121] In contrast, in *Town of Dryden*, the court relied on a previous decision upholding a local zoning ordinance to decide in favor of the city.[122] Unfortunately, the powers of local control are too unpredictable and vary too much from state to state to be the main tool to control the impacts of fracking on water resources.

### *B. The Benefits of State Regulation*

Due to the unpredictable nature of local regulation, some level of state control is required in order to efficiently and consistently address water resource concerns and the other impacts of fracking. There are a number of policy reasons why the power to regulate fracking should reside with the state. Texas provides a good example. Texas is the second largest state by land area in the United States, and water resources can vary widely between oil and gas formations. In the Barnett Shale in central Texas, 59% of the water used for fracking comes from surface water, 41% from groundwater, and less than 1% is from reuse and recycling.[123] In the Eagle Ford Shale to the south, however, groundwater supplies 90% of the total water used for oil and

116 MONIKA FREYMAN & RYAN SALMON, CERES, HYDRAULIC FRACTURING AND WATER STRESS: GROWING COMPETITIVE PRESSURES FOR WATER 1, 10 (2013), *available at* http://www.ceres.org/resources/reports/hydraulic-fracturing-water-stress-growing-competitive-pressures-for-water.

117 *Id.*

118 Wallach v. Town of Dryden, 16 N.E.3d 1188, 1192 (N.Y. 2014).

119 Terrence S. Welch, *Backyard Drilling: Local Regulation of Gas Drilling in the Barnett Shale of North Central Texas*, *in* BEYOND THE FRACKING WARS, *supra* note 1, at 225, 228.

120 Colo. Oil & Gas Ass'n v. Longmont, No. 13CV63, at 5, 8–9 (Colo. Dist. Ct. July 24, 2014) (citing Voss v. Lundvall Bros., Inc., 830 P.2d 1061 (Colo. 1992), and Colo. Mining Ass'n v. Bd. of Cty. Comm'rs of Summit Cty., 199 P.3d 718, 721 (Colo. 2009)).

121 *Id.*

122 *Town of Dryden*, 16 N.E.3d at 1195.

123 U.S. DEP'T OF ENERGY, *supra* note 12, at 79.

gas development.[124] State-level controls can regulate both groundwater and surface water resources on a large enough scale to prevent shifting the water burden from locality to locality and between groundwater and surface water. For example, a state could mandate certain baseline requirements for recycling to reduce the impacts uniformly on both water sources.

Additionally, all western states currently have a statewide water plan or regional planning process in place to address future water needs.[125] If these plans do not already address water use for fracking, states could easily add an addendum requiring conservation measures such as baseline water quality and quantity monitoring, water recycling, and tracking of flowback and produced water. These basic measures would apply evenly throughout the entire state, and monitoring in particular could provide a comprehensive overview of all of the state's water resources. Finally, although not every state has permitting programs in place for both surface and groundwater, where these programs exist regulators could use them to achieve statewide implementation of water resource goals as well. If certain goals were set through a water plan, state agencies analyzing water permits could easily add requirements for recycling, mitigation, tracking, or other provisions as needed to specific permits for water use or even to change of use applications for oil and gas.

The necessity for state regulation, however, should not preclude the ability of localities to implement moratoria on fracking within city limits to create time for states to update and implement water use regulations. State legislatures are frequently slow to respond to local needs and in some cases are blinded by the rapid influx of tax dollars created by oil and gas development. On top of this, oil and gas development is fast-paced because of changing prices and markets, and the push to out-drill competing companies.[126] Without a way to slow development, localities and their water resources could easily be overwhelmed before any thought is given as to if and how development should proceed. Moratoria provide the time needed for localities to lobby their state legislators and help formulate meaningful controls on water resources while still allowing for the consistency of statewide regulations. In addition, because moratoria are temporary, implementing them could avoid many of the pitfalls normally associated with local regulations. For instance, moratoria are likely easier to pass since they strike a balance between completely banning development and unfettered development.

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124 *Id.* at 81.

125 ANGELA SCHACKEL BORDEGARAY ET AL., NEW MEXICO INTERSTATE STREAM COMM'N, OVERVIEW OF WATER PLANNING IN WESTERN STATES 1 (2009), *available at* http://www.ose.state.nm.us/Planning/SWP/WesternStatesWaterPlanningOverview-2009-02.pdf.

126 *See* Alison Sider, *Fracking Firms that Drove Oil Boom Struggle to Survive*, WALL ST. J., Sept. 23, 2015, http://www.wsj.com/articles/fracking-firms-that-drove-oil-boom-struggle-to-survive-1443053791 (last visited Feb. 15, 2016); Alison Sider, *Fracking Firms Face New Crop of Competitors*, WALL ST. J., July 9, 2013, http://www.wsj.com/articles/SB10001424127887323300004578555743698255254 (last visited Feb. 15, 2016).

In addition, moratoria are less risky legally since they are temporary and can avoid takings issues.[127] In *Tahoe-Sierra Preservation Council, Inc. v. Tahoe Regional Planning Agency*, the U.S. Supreme Court held that a thirty-two month moratorium placed on development around Lake Tahoe was not a taking because the restrictions on development were intended to be temporary, and therefore the properties would recover their value once the moratorium was lifted.[128] Although the Court stated that "whether a temporary moratorium effects a taking . . . depends upon the particular circumstances of the case,"[129] the concept that temporal restrictions likely do not qualify as complete economic wipeouts provides a safeguard for localities implementing moratoria. Finally, state courts may also treat moratoria differently than bans.[130] Particularly in Colorado, where district courts have so far been unfriendly to local regulations banning or even temporarily delaying oil and gas development, there is positive case law that supports moratoria as legal options for local regulators.[131] Specifically, a moratorium may be allowed under state land use laws as long as it is only in place for a reasonable period of time and is necessary to prepare a development plan.[132] In the end, moratoria provide localities with a valuable tool to control the pace of fracking and ultimately the fate of local water resources. This powerful tool is not inconsistent with substantive state regulations governing water resources and should remain available to localities facing changing demands on their water resources.

## VI. CONCLUSION

The United States is the world's largest producer of oil and gas and with this comes the consumption of large amounts of water for fracking.[133] We live in a world where water resources are shifting and shrinking from increases in population, drought, and climate change.[134] We can no longer

127 *See* Tahoe-Sierra Pres. Council, Inc. v. Tahoe Reg'l Planning Agency, 535 U.S. 302 (2002); *see also* Holli Brown, *The Attack on Frack: New York's Moratorium on Hydraulic Fracturing and Where It Stands in the Threat of Takings*, 41 ENVTL. L. REP. NEWS & ANALYSIS 11,146, 11,149–50 (2011).

128 *Tahoe-Sierra*, 535 U.S. at 332.

129 *Id.* at 321.

130 Colin C. Deihl et al., *Tug of War over Colorado's Energy Future: State Preemption of Local Fracking Bans*, 44 ENVTL. L. REP. NEWS & ANALYSIS 10,524, 10,533 (2014).

131 *Id.* at 10533–34; Droste v. Bd. of Cty. Comm'rs, 159 P.3d 601 (Colo. 2007) (upholding a ten-month county moratorium on development).

132 *Droste*, 159 P.3d at 607.

133 See ERIK MIELKE ET AL., WATER CONSUMPTION OF ENERGY RESOURCE EXTRACTION, PROCESSING, AND CONVERSION 17–18 (2010), *available at* http://belfercenter.ksg.harvard.edu/files/ETIP-DP-2010-15-final-4.pdf (explaining that each fracking well uses approximately 3.6 to 4.5 million gallons of water); *see also* INT'L ENERGY AGENCY, 2014 KEY WORLD ENERGY STATISTICS 13, *available at* http://www.fossilfuelsreview.ed.ac.uk/resources/Evidence%20-%20Climate%20Science/IEA%20-%20Key%20World%20Energy%20Statistics.pdf (indicating that the United States is the world's largest producer of natural gas and third largest producer of crude oil).

134 See RICHARD CONNOR ET AL., THE UNITED NATIONS WORLD WATER DEVELOPMENT REPORT 2015: WATER FOR A SUSTAINABLE WORLD 2, 11, 26, 30, 45, *available at* http://unesdoc.unesco.

ignore the water demand created by fracking. We must adapt our regulatory systems to address this issue as quickly as possible, and at this point, state regulatory systems are the most comprehensive vehicle to do so. Localities will still play a vital role in the years to come, but we must all work together to effectively protect our water resources for the future.

org/images/0023/002318/231823E.pdf (2015) (detailing the pressures that population growth, drought, and climate change put on the water systems).