

## State of the Debate: Natural Gas Fracking in New York's Marcellus Shale

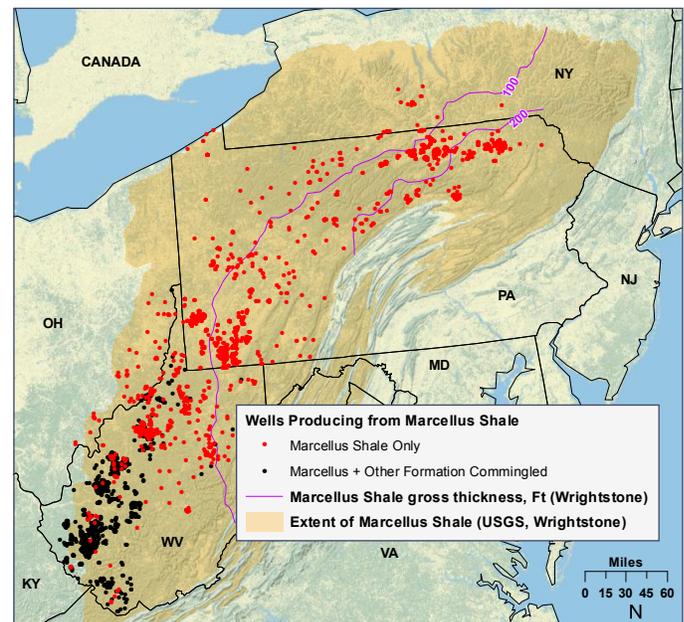
a report from the Energy and Environmental Policy Initiative

### Executive Summary

Natural gas extraction through high-volume hydraulic fracturing, often used with horizontal drilling (“fracking”), increased by 24 percent from 2006 to 2011, and is projected to grow unabated. One of the most promising sources of natural gas is the Marcellus Shale, underlying several eastern US states, including New York. While production is underway in neighboring states, New York currently has a *de facto* moratorium on the type of high-volume fracking necessary to extract gas from the Marcellus Shale. In 2008, New York began updating gas drilling regulations to meet state environmental review requirements. The state is weighing the environmental and health risks and economic benefits of fracking, and is navigating overlapping jurisdiction with local, regional, and the federal governments. Although the effects of fracking are largely unknown in New York, residents are learning from Pennsylvania’s experience with fracking and are demonstrating extraordinary civic engagement, mainly against fracking. New York State has a long history of both resource extraction and environmental protection, but fracking is proving to be an intractable issue with high stakes on all sides and no clear resolution in sight.

### Introduction

Over just five years, from 2006 to 2011, domestic production of natural gas increased by 24 percent,<sup>1</sup> with unprecedented development occurring in 32 states nationwide.<sup>2</sup> The US Department of Energy projects growth in natural gas production to continue unabated, increasing by over 40 percent from 2011 through 2040.<sup>3</sup> This rapid growth is due almost entirely to natural gas extraction from shale formations, or fine-grained rock, and requires use of a technique known as high-volume hydraulic fracturing in conjunction with horizontal drilling—commonly referred to as “fracking.” The volume of natural gas extracted through fracking is expected to grow from two percent of total natural gas production in 2000 to 50 percent in 2040.<sup>4</sup>



Source: US Energy Information Administration, “Marcellus Shale Gas Play, Appalachian Basin.” [http://www.eia.gov/oil\\_gas/rpd/shaleusa5.pdf](http://www.eia.gov/oil_gas/rpd/shaleusa5.pdf).

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This case study examines New York’s attempt to regulate fracking, with particular emphasis on the state’s regulatory process; federal, regional, and local input; consideration of state-specific economic, environmental, and health risks; and civic engagement across the state. It is a stark contrast to Pennsylvania’s extraction of natural gas from the Marcellus Shale, which has proceeded rapidly since permits were first issued in 2005, and in which case attempts are being made to understand environmental, health, and economic impacts only as drilling is underway. Although New York, like other states, has unique historical, geographic, political, and cultural features that shape its current approach, its process of weighing risks and benefits to the economy, environment, and health, as well as accounting for public participation and sound science, holds lessons for other jurisdictions considering the impact of fracking.

## Historical Perspective

New York has both a long history of resource extraction and as a leader in environmental conservation and protection. The state enjoys an abundance of natural resources, including timber, water, and fossil fuels. Environmental conservation measures have at times resulted directly from threats to these resources and other times from moral or philosophical positions. Throughout its history, the state has balanced its interest in conserving natural resources for future generations with the pressures of exploitation for economic gain or utilization by a current generation. This section explores New York’s history of oil and gas resource extraction, regulation of the use of natural resources and environmental protection, and the current challenges that New York faces on both fronts, with a particular emphasis of these factors within the Marcellus Shale, one of the state’s most promising sources of natural gas.

**Fossil Fuel Extraction.** Unlike other states in the Northeast United States, New York has a long history of resource extraction, specifically of fossil fuels. Natural gas seeps in Ontario County were first reported in 1669, near the Finger Lakes and just south of Lake Ontario.<sup>5</sup> As early as the 1820s, a natural gas seep in Fredonia, NY was drilled and used to light the village’s buildings and streets,<sup>6</sup> and 1828 the state saw the opening of the first Lake Erie Lighthouse illuminated by natural gas.<sup>7</sup> By the 1880s, natural gas companies were producing commercially and piping gas to towns across western New York, and expanding their scope via longer intrastate pipelines and municipal gas distribution systems by the close of the century.<sup>8</sup> Although the state attempted to regulate transmission and storage of oil and gas in the 1800s, a lack of uniform statewide enforcement limited the effectiveness. However, an 1882 amendment to the regulations gave half of the fine collected to the informer of the violation, greatly increasing the state’s enforcement ability.

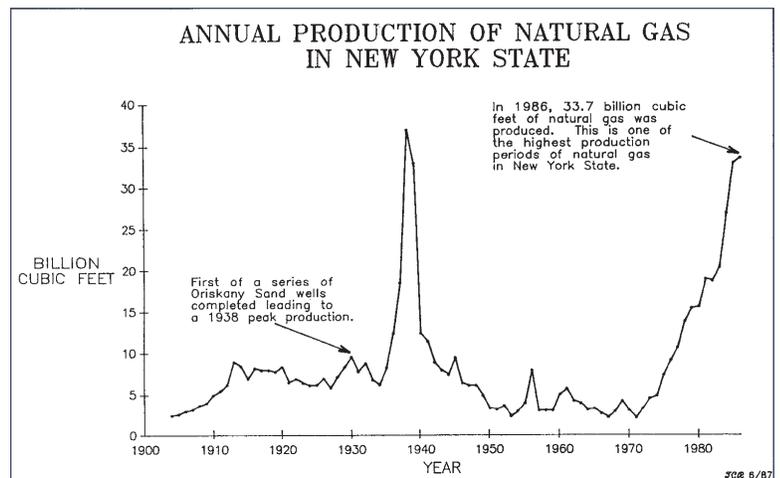


Barcelona Lighthouse, Lake Erie—First lighthouse to be illuminated by natural gas. Source: LighthouseFriends.com

Oil was discovered and produced commercially along a similar timeline. The first known oil seep in New York was reported in 1627 near the Pennsylvania border in western NY. In the same location—Allegany County—the first recorded oil well was built in 1860. A commercial oil well in New York was drilled five years later, shortly after the world’s first one was drilled in Titusville, PA.<sup>9</sup> By 1882, New York was the nation’s top oil-producer;<sup>10</sup> it was also the state’s peak year for oil production, although brief resurgences occurred as new pools were discovered and drilled.<sup>11</sup> Overall, the early oil and gas boom was beneficial for New Yorkers, leading to improvements in quality of life and contributing to development of municipal water systems and fire departments.<sup>12</sup>

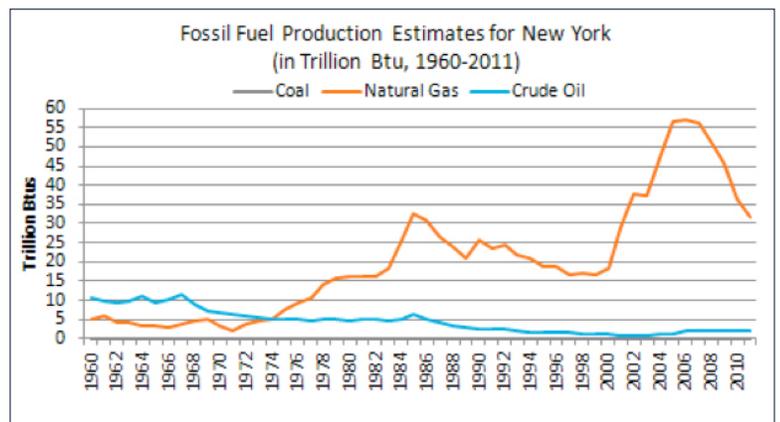


Over the 20<sup>th</sup> century, annual production of natural gas in New York fluctuated as new gas resources were discovered, often due to advances in technology. In the early 1930s, record natural gas production came from wells drilled in natural gas fields in the Oriskany sandstone formation. Explorers discovered this formation as depletion of New York's shallower gas wells led to searches for deeper prospects. In the late 1960s, advances in seismic prospecting drove the discovery of the Onondaga reef fields in western and central New York, leading to another (but smaller) increase in natural gas production.<sup>13</sup> Another significant increase in production occurred beginning in 1998 as prolific wells were drilled in the Finger Lakes region; gas from these wells in subsequent years accounted for approximately two-thirds of total production in New York. However, over the past few years, production from those wells has declined.<sup>14</sup>



Source: 1992 GEIS

Discovery of new drilling techniques has also served to increase natural gas production in New York. In particular, the two innovations currently proposed for use in the Marcellus Shale are hydraulic fracturing and horizontal drilling. Hydraulic fracturing experiments began nationally in the mid-1900s and the technique has been used in New York since the 1950s.<sup>15</sup> The process involves pressurized injections of water and chemical additives into porous, but relatively impermeable, geologic formations to "fracture" rock and extract a resource—in this case, natural gas—that is otherwise trapped. Sand, or silica, is pumped into the fractures as a "propping agent" to prevent them from closing as pumping pressure is released.<sup>16</sup> Hydraulic fracturing was widely applied in the 1970s and '80s in New York upon discovery of the Medina sandstone—a low permeability formation.<sup>17</sup> Currently, about half of the oil and gas wells in New York use hydraulic fracturing.<sup>18</sup>



Source: US Energy Information Administration [http://www.eia.gov/state/seds/sep\\_prod/SEDS\\_Production\\_Report.pdf](http://www.eia.gov/state/seds/sep_prod/SEDS_Production_Report.pdf)

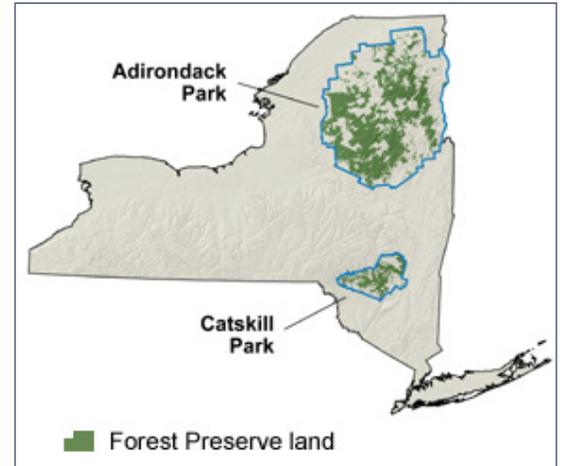
A complementary technique—horizontal drilling—involves a gas well drilled down vertically to the gas-bearing rock formation, and then curved such that the well is drilled horizontally within the formation. This technique became commercially viable in the late 1980s and results in exposure of significantly more reservoir rock to the well bore surface than a conventional vertical well, therefore allowing for greater resource extraction.<sup>19</sup> In 2007, 10 percent of well drilling permits issued by New York were for horizontal (or directional) wells.<sup>20</sup> These innovations have allowed for gas extraction from "unconventional" gas plays, or formations that are deeper or less permeable ("tighter"), where extraction was previously uneconomical or technologically impossible. Beginning especially at the turn of the 21<sup>st</sup> century, a greater share of natural gas production has come from unconventional sources. The current frontier for unconventional drilling is in shale formations, where natural gas occupies extremely small pores or fractures, making the shale rock relatively impermeable to gas flow.<sup>21</sup> Nonetheless, presently, over 95 percent of the natural gas supply needed to meet New York demands is imported from other states or Canada via interstate pipelines,<sup>22</sup> and industry representatives have cited New York's current ban on fracking as depressing interest in drilling for natural gas.<sup>23</sup>





times as many employees working in agriculture, forestry, fishing, hunting, and mining as in the rest of the state.<sup>32</sup> The Adirondack Park master plan for state lands is intended to “guide the preservation, management and use of these lands.”<sup>33</sup> Similarly, in the Catskill Park, approximately 40 percent of land is state forest preserve, with the balance remaining private land.<sup>34</sup>

New York also enjoys relatively abundant water resources. The state borders two Great Lakes—Erie and Ontario—where the cities of Rochester and Buffalo are situated, and includes over 700 miles of shoreline. Approximately 80 percent of New York’s fresh surface water and nearly 50 percent of land are contained in the drainage basins of Lakes Erie and Ontario and the St. Lawrence River to the north.<sup>35</sup> New York also has over 50,000 rivers and streams,<sup>36</sup> notably the Hudson River running from northern New York to the Atlantic Ocean. The 11 Finger Lakes, spread throughout west-central New York, are deep, glacial lakes that are important bases of both tourism for the region and water resources. New York is the 11th “wettest” state in the nation, with four percent of the state covered in water, excluding the Great Lakes.<sup>37</sup> In addition to surface waters, New York has significant groundwater resources. Eighteen primary water supply aquifers (yielding sufficient water to be a major municipal water supply) underlie about four percent of upstate New York with additional principal aquifers (not presently used for water supply) underlying 11 percent of the state.<sup>38</sup> This water supply is particularly relevant for New York City, which receives 1.2 billion gallons of drinking water daily from a watershed in southeastern New York under the Catskill Park—the largest unfiltered water supply in the United States.<sup>39</sup>



Source: New York State Department of Environmental Conservation, “New York’s Forest Preserve.”

Other major watersheds in New York include the Susquehanna and Delaware River watersheds, located in southern New York and underlying several other neighboring states. The Susquehanna River Basin is the second largest basin east of the Mississippi River.<sup>40</sup>

State	% Covered in Inland Water (excl. oceans and Great Lakes)
Rhode Island	17%
Washington, DC	11.5%
Louisiana	9.5%
Florida	8.7%
North Carolina	8.1%
Maine	7.3%
Maryland	7%
Minnesota	6%
Massachusetts	5.4%
New Jersey	5.3%
New York	4%

Source: US Geological Survey. Retrieved from <http://ga.water.usgs.gov/edu/wetstates.html>

Due in part to its abundant natural resources, New York has a substantial history of regulating use of those resources, especially oil and gas, and of legislation aimed at protecting the environment, which also impacts resource extraction. Although several laws were passed in the late 1800s and early 1900s regulating oil and gas drilling processes, addressing storage, treatment of abandoned wells, and leasing of state land for drilling, all previous oil and gas laws were repealed in 1963. Authority was subsequently delegated to the state’s Department of Environmental Conservation (DEC)<sup>41</sup> to regulate drilling (existing wells were grandfathered under the old laws). The

mission of the new law and reorganization was to “prevent waste, increase ultimate recovery, and protect correlative rights of all the interests involved” in production from natural resources of oil and gas. Known as the Oil, Gas and Solution Mining Law, regulations implementing this law now address each aspect of drilling, completion, production, and plugging and abandonment of oil and gas wells.<sup>42</sup>

In 1970—shortly after this reorganization—the federal government passed the National Environmental Policy Act (NEPA). The law established national environmental policy goals and processes for federal agencies to implement those goals; in particular, the use of environmental impact statements (EIS) for all major federal actions. NEPA catalyzed New York to create its own “little NEPA.” Over the next five years several iterations of legislation were introduced and passed through one or both of New York’s legislative bodies.<sup>43</sup> However, it wasn’t until 1975 that New York passed the State Environmental Quality Review Act (SEQRA), requiring that both state and local units of government account for the environmental impact of proposed activities in their decision-making processes.

New York is one of 16 states (plus the District of Columbia, Guam, Puerto Rico, and New York City) that have enacted NEPA-like environment planning requirements.<sup>44</sup> SEQRA requires that most projects or activities proposed by, and discretionary permits for private activity issued by state agencies or local units of government be subject to an environmental impact assessment. If the unit of government determines that one or more adverse environmental effects may occur, it must develop an EIS and conduct a public review process before the activity can proceed. Although each unit of government is individually responsible for meeting its SEQRA obligations, the DEC is charged with issuing regulations regarding the environmental impact assessment process and provides interpretations and guidance about SEQRA.<sup>45</sup> In contrast with NEPA and many other “little NEPAs,” New York’s law is both procedural and substantive. That is, it dictates a process by which agencies evaluate the environmental impact of actions, but also requires that agencies, “to the maximum extent practicable, minimize or avoid adverse environmental effects, including effects revealed in the environmental impact statement process,” and impose practicable mitigation measures.<sup>46</sup> Unlike NEPA, SEQRA instructs agencies to integrate environmental considerations into their actual day-to-day decisions, and sets a lower threshold for actions that trigger an environmental impact statement.<sup>47</sup> This principle of avoiding adverse environmental impacts is a significant difference between SEQRA and the federal NEPA, and reflects New York’s commitment to balancing resource utilization with environmental protection. New York’s rigorous approach to SEQRA is not unique to this law; the state is an active participant in several related environmental and natural resource initiatives, including ones around climate change and regional sustainability.

**Current Challenges.** Despite New York’s long history with fossil fuel extraction and strong regulations for confronting environmental risks, fracking has posed a seemingly intractable policy issue. Hydraulic fracturing and horizontal drilling have been used previously in New York to drill for unconventional gas; however, the current proposals for Marcellus Shale drilling rely on *high-volume* hydraulic fracturing. Based on Pennsylvania’s experience, the DEC estimates that high-volume fracking may require 3.6 million gallons of water per well, on average, with multiple wells drilled at each site.<sup>48</sup> This is a significantly greater use of water, combined with chemical additives, than for previous drilling, and raises new concerns about water resources and contamination as water flows back out of the well.

New York’s attempt at regulation has been protracted and contentious, and is as-yet unresolved due in part to the unknown impacts of fracking. The economic impact of allowing fracking to proceed is uncertain and unevenly distributed across the state and even within small jurisdictions. The risks of environmental and health damage are largely unknown, and anecdotal information from neighboring states can seem alarming. Governance and regulatory issues related to fracking involve navigating jurisdictional overlap among not only state, but federal, regional, and local authorities. Civic engagement from anti-fracking citizens’ groups and celebrities has been vigorous and polarized. The remainder of this case study will explore each of these issues in greater depth.

## Economic Impacts

Experience with oil and gas development in New York generally, and with fracking in other states, has demonstrated economic impacts both positive and negative. New York’s potential economic benefits of gas production in the Marcellus Shale could derive from two primary sources: taxes or fees on the production of natural gas, and direct and indirect employment effects. Potential economic drawbacks include the toll on local infrastructure from production activities and environmental damage. Of course, overshadowing the consideration of any economic impact is uncertainty about the scope of fracking activity in the Marcellus Shale due to future developments in both demand and supply that are beyond the state’s control.



A severance tax on natural gas production is the most direct source of revenue from fracking, and over 80 percent of states with actual or potential natural gas resources impose such a tax.<sup>49</sup> Of the five states with no severance tax, the four besides New York impose a different fee mechanism (Pennsylvania), have banned fracking (Vermont), or have low or uncertain projections of natural gas reserves (New Jersey, Georgia). Currently, New York assesses a production tax on gas by applying the local property tax to the assessed production value, treating the natural gas as “property” for the purpose of taxation. In 2011, consultants to New York State estimated the property tax payment for an illustrative natural gas well at approximately \$1.5 million over its 30-year lifespan.<sup>50</sup> However, as the DEC drafts regulations governing fracking, several public comments have called for imposing a severance tax. One local government demanded that assessment of a severance tax be a prerequisite for even considering issuance of drilling permits.<sup>51</sup> However, the DEC maintains that taxation is beyond its scope of authority and would require legislative action.<sup>52</sup> In his last budget proposal for New York, then-Governor David Paterson proposed a three-percent severance tax on natural gas produced from the Marcellus Shale (or the Utica Shale, which lies under the Marcellus formation) using a horizontal drill.<sup>53</sup> The state projected that this proposal would raise \$1 million in revenue in 2011-12, increasing to \$5 million in 2013-14.<sup>54</sup>

Fracking could also spur New York's economy by generating local jobs. A consultant hired by the state projected creation of 6,200 - 24,800 new jobs directly related to fracking, with similar levels of new indirect employment. Combined, this would account for 0.2 - 0.7 percent of New York's total labor force (in 2010), and result in state revenue from greater personal income tax receipts, and local government revenue from the additional economic activity.<sup>55</sup> New economic activity would be concentrated in areas with drilling—generally the Southern Tier of New York, where recovery from the Great Recession has been slow.<sup>56</sup> At least one job fair has been held for Southern Tier residents interested in gas industry jobs,<sup>57</sup> and another town's local water utility officials proposed accepting fracking wastewater as a way to generate needed revenue.<sup>58</sup>

New York would also likely face costs associated with fracking, including more rapid deterioration of state and local roads due to increased truck traffic, and required upgrades to roads and interchanges to support the additional traffic. The state will also face administrative costs to approve permits, conduct environmental monitoring and oversight, and provide technical support and oversight services to local governments that monitor water quality in local drinking wells.<sup>59</sup> Given the reliance on tourism around the Finger Lakes in the Southern Tier, any environmental damage, or even adverse community impacts like increased noise, could also impose economic costs.

All of these estimates suffer from great future uncertainties, and as yet unknown developments in both supply and demand. In addition, shale gas extraction economies are often characterized by a boom-bust cycle, whereby a rapid increase in economic activity is followed by a rapid decrease. Economic growth occurs as drilling is established, but the ongoing extraction is capital- rather than labor-intensive, and may produce relatively few permanent jobs. While the large size and geological diversity of the Marcellus Shale may serve to extend economic activity over time and across the region,<sup>60</sup> overall uncertainties in supply and demand as well as the cyclical nature of fracking lead to enormous difficulties in weighing economic costs and benefits.

## Environmental & Health Risks

Reports of environmental and health risks related to fracking are widespread. While evidence of actual impacts is beginning to emerge from states with ongoing fracking activities, much of it remains anecdotal. The risks primarily relate to water issues and are largely common across all states, and include: large water withdrawals from ground and surface water sources, groundwater contamination during drilling, surface water contamination from spills of chemicals and wastes, and disposal of contaminated water that flows out of the well. The first two issues, water withdrawal and groundwater contamination, are driving the fracking debate in New York.

**Water Withdrawals.** A substantial volume of water is required during the fracking process, as it is injected into the wells under high pressure to create fractures or cracks in the shale formation. Before injection, water is mixed with chemical additives and sand which serves to effectively prop open the fractures, allowing natural gas to escape. Based on experience in Pennsylvania and projections in New York, the DEC estimates that fracking will require, on average, 3.6 million gallons of water per well. At expected peak drilling levels, total water withdrawals could result in increased demand for fresh water in New York of 0.24 percent. Even this level, however, could result in adverse impacts during low-flow or drought conditions, according to the DEC's draft environmental impact statement.

At present, New York ranks as one of the top states for total water withdrawals. Many headwater streams rely entirely on groundwater to provide flows in the summer and could be significantly reduced or depleted from water withdrawals at levels required for fracking.<sup>61</sup> In 2011, due in part to increased interest in fracking, New York's legislature extended the Great Lakes permitting requirement for large volumes of water withdrawals to withdrawals from other state bodies of water, as well. Drillers wishing to withdraw water over a certain volume for fracking—as well as for other industrial, commercial, and agriculture uses—will have to obtain a permit from the DEC. This new requirement overlaps, in part, with permitting requirements of the regional River Basin Commissions with jurisdiction in New York, and the DEC's regulations state that they intend to seek consistency in water resource management between the state and regional bodies.<sup>62</sup>

**Groundwater Contamination.** Perhaps the most widespread concern among the public—in other states engaged with fracking and in New York—is related to contamination of groundwater. As large volumes of water with chemical additives are injected into the shale formation, local residents are concerned that water could migrate vertically into shallower groundwater zones, or even horizontally into underground aquifers, contaminating drinking water. Natural gas itself could also leak from the well into groundwater or a nearby aquifer. Additionally, surface spills of wastewater or other contaminated fluids could seep into aquifers.

Approximately half of New Yorkers rely on groundwater as a source of potable water, either through personal wells or aquifers. Indeed, the entire population of New York City receives fresh water from an upstate aquifer system, for which it has permission from the Environmental Protection Agency (EPA) and the New York Department of Health to operate as an unfiltered drinking water supply. The much smaller city of Syracuse has a similar exemption from filtration requirements. These exceptions are maintained through longstanding cooperative agreements with residents who live and work near aquifers. In general, aquifers are particularly susceptible to contamination from surface spills because they are surrounded by permeable material (e.g. sand and gravel) and are shallow in depth.<sup>63</sup> New York City and Syracuse's watersheds are subject to high precipitation events, which, when combined with greater soil exposure from drilling activity, increases the volume and intensity of storm water runoff that can carry contaminants. However, groundwater is better (but not necessarily fully) protected from contamination due to migration of water injected into fracking wells because shale is a natural, low-permeability barrier to the vertical movement of water. On balance, the DEC concluded that the risk to aquifers is small, but significant, due to the difficulty and expense of reclaiming a contaminated aquifer. Given the aim of preserving the New York City and Syracuse watersheds as unfiltered drinking water supplies, and strong opposition from New York City to fracking, the DEC recently proposed banning fracking in and around these aquifers.<sup>64</sup>

This ban, however, has not settled concerns about groundwater contamination. Largely fueled by anecdotal evidence emerging from other states with fracking (particularly Pennsylvania), concerns surround numerous reports of methane (the main component of natural gas) migration into drinking water; the increased turbidity of drinking water; and concerns about contamination by salts, metals, and radioactivity in water. However, these reports and risks are characterized by great uncertainty due to lack of publicly-available baseline data for water quality. Additionally, geology varies across the Marcellus Shale, so findings in Pennsylvania are not necessarily directly applicable to fracking in New York. However, recent peer-reviewed research found that certain homeowners had drinking water contaminated by nearby fracking operations, likely due to poor well construction.<sup>65</sup> Research on the health effects of fracking and groundwater contamination is scarce, but is currently spearheaded by Geisinger Health System in western Pennsylvania. Geisinger is uniquely positioned to study health effects because it treats hundreds of thousands of individuals who reside near the Marcellus Shale, and has pre- and post-drilling data on health conditions through its electronic medical record system. Evidence from this study should help inform fracking's environmental and health risks in New York.

## Governance

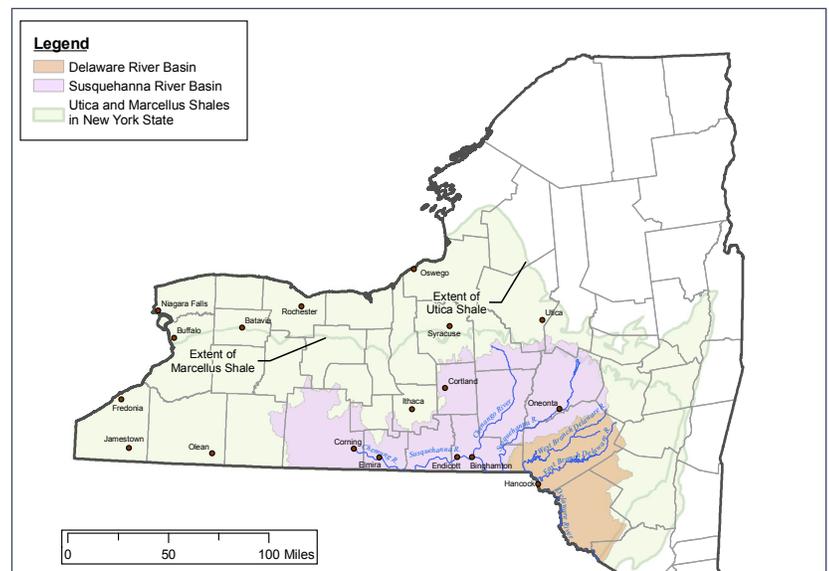
The Marcellus Shale knows no political boundaries, and fracking activities cross jurisdictional lines of several existing statutes. In fact, while shale gas development is primarily subject to state law and regulation—as with oil and gas drilling generally<sup>66</sup>—nearly every other level of government has also claimed a regulatory stake via different approaches to resource management or environmental protection. Local jurisdictions in New York have asserted authority over drilling activity through their state-delegated power to regulate land use. Regional water-permitting authorities have jurisdiction to regulate intrastate water resources used for drilling. Finally, federal laws govern activities related to, or impacted by fracking, including air, water, land, and plants and animals. As New



York faces demand for fracking in the Marcellus Shale, each level of government—federal, regional, state, and local—is reacting. The state, as the primary regulatory body, is simultaneously trying to update its own regulatory process for fracking and navigate its relationships and shared authorities with other jurisdictions.

**Federal Authority.** The current federal regulatory system is both fragmented and incomplete. At least seven different statutes—including those regulating water, air, drinking water specifically, environmental remediation, waste management, endangered species, and toxic substances—could potentially address some aspects of fracking.<sup>67</sup> However, these laws either explicitly exempt fracking, apply only tangentially, or have not yet been applied to fracking directly. Hurdles to future federal legislation are significant, due to the uncertainties around risks from fracking, industry influence, political stalemate, and the nation's hunger for low-cost, domestic fuel. Given this, the federal role in New York's process has been nearly nonexistent, although the US Environmental Protection Agency has submitted detailed comments to the state's DEC regarding their proposed permitting process for fracking and environmental impact statements.

**River Basin Commissions.** The Delaware and Susquehanna River Basins both overlap with the Marcellus Shale. The gas industry may target these large bodies of water for withdrawal for fracking. Environmental concerns related to surface and groundwater are particularly poignant, given the likely demands on water use and potential proximity of drilling. The Delaware and Susquehanna River Basin Commissions (RBC) each have independent authority to regulate shale gas drilling within their respective boundaries, including issuing regulations, requiring permits for drilling, and imposing fines for noncompliance.<sup>68</sup> The RBCs are the most significant interstate compacts for regulation relevant to shale gas development,<sup>69</sup> and reflect a longstanding cooperative approach between states and the federal government.



Source: 2011 revised draft SGEIS.

The Delaware RBC is a partnership between the federal government and the four Delaware basin states—New York, New Jersey, Pennsylvania, and Delaware—and is used primarily for watershed management. The Commission was created in 1961 before strong environmental legislation existed, possibly contributing to its broad authority<sup>70</sup> over both water quality and quantity-related issues. During 2010 and 2011, the Delaware RBC commenced a regulatory process for fracking, over the protests of New York State, which asserted that the regulations—covering only a portion of the state—would conflict with New York's and cause confusion and duplication. The Delaware RBC assured the state that their regulations would be complementary and superseded by any more stringent state regulation.<sup>71</sup> In mid-2011, New York's Attorney General sued the Delaware RBC, asserting that their proposed regulations would permit fracking without a full environmental review, violating NEPA. The case was subsequently dismissed, but indicates the level of tension at the time between the state and RBC. Recently, the Commission indefinitely postponed its regulatory process<sup>72</sup> due to opposition from Delaware and New York, effectively barring fracking in the basin.

The Susquehanna RBC's authority is less broad, covering water withdrawal and consumptive use, but not water quality.<sup>73</sup> Created in 1970, the Susquehanna RBC is comprised of the governors of Pennsylvania, New York and Maryland, and the federal Secretary of the Interior. Currently, the Susquehanna RBC, perhaps due to its more limited scope, has rejected calls from environmentalists to conduct an environmental assessment and to directly regulate fracking. Instead, it monitors water withdrawals within the river basin, an activity that is safely within its jurisdiction.<sup>74</sup>

**State Regulatory Process.** The New York State DEC is charged with managing natural resources to assure protection and balanced utilization; to prevent and abate water, land, and air pollution; and to regulate storage, handling, and transportation to prevent pollution. The Department also regulates the drilling, operation, and plugging of oil and natural gas wells.<sup>75</sup> The DEC's ability to regulate drilling is not affected by the exemptions that fracking enjoys from federal legislation.<sup>76</sup>

Given this charge and active oil and gas drilling in New York, in 1992 the DEC finalized a generic environmental impact statement (GEIS) to comply with SEQRA and to clearly establish guidelines for environmental review and approval of the DEC's actions subject to New York's Oil, Gas and Solution Mining Law. The GEIS is general and conceptual, seeking to eliminate the need for site-specific EISs for individual well sites that are expected to have common environmental effects. It defines permit application categories with insignificant environmental impacts and those that may, or always, have significant impacts and therefore require a supplemental EIS or site-specific environmental assessment.<sup>77</sup> Well drilling applicants whose documentation conform with the GEIS and who do not fall into categories requiring heightened scrutiny need not conduct a full environmental assessment, allowing the DEC to issue permits more rapidly. At the time the 1992 GEIS was finalized, high-volume fracking was not contemplated. However, by 2008, permit applicants to the DEC proposed using it in six counties in New York, with development potential in several other counties.<sup>78</sup> Although many aspects of shale well development are covered by the GEIS, others—including the use of large volumes of water and additives anticipated by fracking applications, possible drilling in the New York City watershed and near other bodies of water, and the longer duration of disturbance at drilling sites with multiple wells—vary significantly enough to prompt additional review. In response, New York's then-Governor Paterson required the DEC to issue a supplement to the GEIS, called the SGEIS, to specifically address high-volume fracking.

To develop the SGEIS, the DEC evaluated potential impacts to groundwater, surface water, wetlands, air quality, noise, traffic, community character, cumulative impacts, and ways to incorporate local government in the regulatory process. In October 2008, the DEC published a draft SGEIS scope to determine relevant and irrelevant topics, identify areas where the department needed more information, and begin to craft ways to minimize adverse impacts.<sup>79</sup> The scope was subject to a public review process, and the DEC received nearly 200 verbal comments at six public forums and nearly 4,000 written comments through December 2008. The DEC released the final scope in February 2009 with an expanded roster of considerations for issuing fracking permits, including air quality, potential requirements for private water well sampling, and evaluation of phased permitting alternatives.<sup>80</sup> At this point in the process, the DEC anticipated finalizing the SGEIS by summer 2009.<sup>81</sup> However, due in part to growing public awareness and activism, a 1,500-page draft SGEIS wasn't released until September 2009. The DEC again hosted a public review process, receiving over 200 verbal comments at four public hearings throughout the state, and over 13,000 written comments.<sup>82</sup>

New Yorkers' response to the draft SGEIS, particularly in New York City, was overwhelming. Particularly contentious was the DEC's proposal to permit drilling near watersheds, including New York City's. In September 2009, a consultant hired by the city to conduct an impact assessment of fracking in New York City's watershed concluded that "numerous activities during all phases of natural gas development have the potential to contaminate groundwater or surface water supplies."<sup>83</sup> The draft SGEIS provided for buffer zones around reservoirs and aqueducts and required special approval for wells near watershed infrastructure, but a coalition of environmental groups, city politicians, and residents strongly opposed any drilling in the city's million-acre watershed.<sup>84</sup> Given the intense opposition, one of the largest gas producer leaseholders in the Marcellus Shale announced in October 2009 that it would voluntarily refrain from drilling within the watershed.<sup>85</sup> Six months later, the DEC announced that drilling in the New York City (and Syracuse) watershed would require a separate environmental impact assessment for each proposed well—an extremely high and costly standard. Although the DEC stopped short of banning drilling, it hoped that this strict level of review would appease city residents. Upstate landowners who live in the city's watershed, however, had leased their land for \$5-6,000 per acre and 20 percent royalties; they eagerly anticipated the financial benefits from fracking, and were frustrated by the delays and uncertainty.<sup>86</sup> One county that was implicated in the ban demanded reparations from the city and state for deprivation of revenue that its residents would have received from leasing their land.<sup>87</sup>

Due to the overwhelming public response and controversy, as well as criticism from the US Environmental Protection Agency, finalizing the draft SGEIS was essentially placed on hold. The New York State legislature intervened in summer 2010, attempting to impose a statutory moratorium on fracking. A bill reached reached then-Governor Paterson's desk in November 2010, but he vetoed it on the basis that it was overly broad and would effectively prohibit existing, low-volume hydraulic fracturing and vertical well drilling. Shortly thereafter, the governor issued an executive order (which was continued by Governor Andrew Cuomo, who assumed



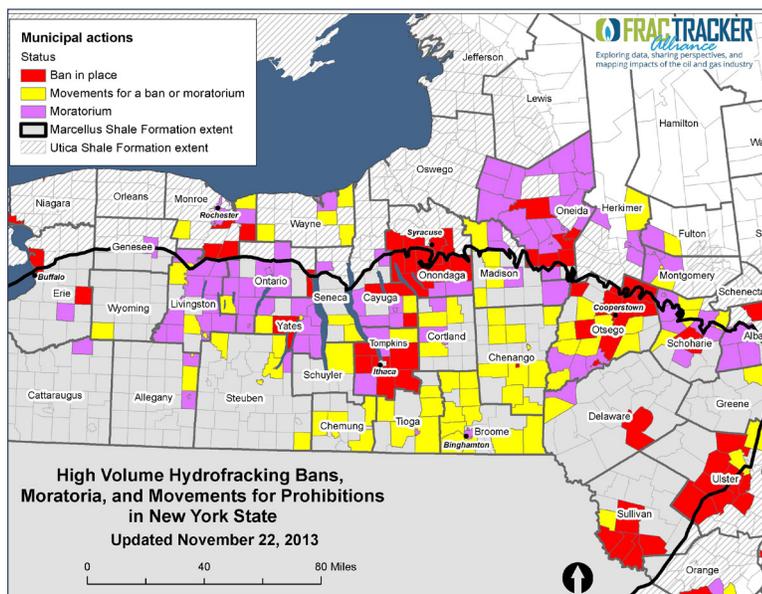
office January 1, 2011) requiring the DEC to issue a *revised* draft SGEIS by June 1, 2011, and reiterated that the DEC may not issue any drilling permits (pursuant to SEQRA) until the final SGEIS is issued.<sup>88</sup> The department complied, and released a preliminary draft SGEIS containing stricter thresholds (or bans) on drilling in watersheds, on state-owned land, within and near primary aquifers and private water wells, and on private lands. It also acknowledged that community and socioeconomic impacts were inadequately addressed in the prior draft, and included specific impact analyses in the revised draft SGEIS released in September 2011. Again, the DEC conducted a public review process, holding public hearings and eventually receiving an unprecedented 40,000 public comments.<sup>89</sup>

As the public debate over fracking dragged on through 2012—with proponents and opponents becoming increasingly polarized—reports emerged that the Cuomo Administration was considering allowing fracking only where the Marcellus Shale is the deepest underground, to reduce the risk of groundwater contamination, and only in towns that welcome fracking. This proposal acknowledged the intense local opposition in some areas, while allowing flexibility to accommodate areas that are struggling economically and could benefit from fracking.<sup>90</sup> State regulators also considered the need for a health review of fracking—a focus of many of the comments submitted to DEC—and in September 2012, Governor Cuomo officially requested that the State Department of Health conduct a health impact assessment and promised that a decision on fracking would be delayed until its completion. That process is currently ongoing, with no timeline or deadlines for its completion, although Governor Cuomo pledged a decision before the 2014 election.<sup>91</sup>

New York's ongoing regulatory process has been antagonistic and has engendered unprecedented levels of civic engagement, evident in part through the public review period for the DEC's regulatory process. Although the debate around the draft SGEIS was primarily focused on drilling in the NYC watershed, the ongoing debate around the revised draft SGEIS shows a polarized public: those who support fracking, and those who will only support a complete ban. While New Yorkers are still somewhat divided between New York City and upstate, the divisions also exist from one upstate town to its neighboring towns.

**Local Action.** Local units of government derive powers from state delegation, specifically around planning and zoning. In New York, municipal home rule powers are derived from both statute and the state constitution, and give localities express authority to enact local laws relating to their property,<sup>92</sup> including for industrial land use activity. The scope and durability of land use powers, as well as the useful linkage between zoning and property taxes, have historically made courts reluctant to allow state preemption.<sup>93</sup> This presumption against preemption was tested as New York engaged in a state regulatory process to permit fracking, while some localities grew concerned about their ability to maintain control over local land use.

In August 2011, the town of Dryden, near Ithaca, NY and the Finger Lakes, became the first locality in New York to ban fracking within its jurisdiction. The town was promptly sued by Anschutz Exploration Corporation—an oil and gas exploration and production company—which sought to drill in the Marcellus Shale. Anschutz argued that the town's zoning powers were preempted by the state's Oil, Gas, and Solution Mining Law. Other localities soon followed suit with bans or moratoria, and were in turn sued by either industry or landowners. However, all three bans or moratoria that were challenged in court were upheld by trial courts as legal exercises of localities' zoning power to either prohibit or assign specific areas for gas drilling operations; the only moratorium overturned (Binghamton) was done so on procedural grounds. In May 2013, the decisions in two cases were upheld by the New York Supreme Court, Appellate Division. The courts affirmed that the powers delegated to the towns to regulate use of land through zoning rules is not preempted by state law, in particular because the zoning ordinances sought only to establish permissible and prohibited land uses generally, rather than regulate detailed gas industry proceedings.<sup>94</sup>



Source: FracTracker Alliance

As of early July 2013, localities in New York had passed 61 bans, 111 moratoria, and established 86 movements to prohibit fracking.<sup>95</sup> Several counties, largely in the New York City metropolitan area, have also banned radioactive gas drilling waste, a potential byproduct of high-volume fracking.<sup>96</sup> The legal battles are not over, however. Norse Energy, which assumed the lawsuit from Anschutz and has invested \$100 million in fracking in New York, announced shortly after it lost in the Appellate court that it would file another appeal.<sup>97</sup> In late June 2013, Dryden filed suit in New York’s highest court requesting a cessation on the oil and gas industry appeals to court decisions, citing repeated court decisions upholding the town’s rights under New York’s home rule doctrine.

In addition to local units of government, landowners are engaged in ongoing battles with oil and gas companies. In particular, many leases that landowners signed over to gas companies were for five years’ duration. As the *de facto* ban on fracking in New York approaches its fifth year, gas companies are attempting to extend the duration of the leases through asserting “force majeure”—or an unforeseen event (the ban) that prevents two sides from fulfilling a contractual agreement. A review of New York gas leases by the *New York Times* found that this occurred in approximately half of leases.<sup>98</sup> A group of landowners, upset with this maneuver, recently sued Norse Energy, arguing that the lives of the lease agreements have been unfairly extended,<sup>99</sup> while Chesapeake Energy reportedly dropped its legal right to retain leases.<sup>100</sup> Regardless of how the DEC proceeds with fracking in New York, the legal battles will likely continue at the local level of government.

**Intergovernmental Cooperation.** While New York State has clear jurisdiction over regulating how and when high-volume fracking proceeds, local units of government have asserted jurisdiction over where it occurs, and the regional RBCs and the federal government may also intervene to regulate potential impacts from fracking. No level of government is likely interested in relinquishing its power to shape the debate, given that each level relies on a power or law that pre-dates the emergence of fracking, and faces potentially high environmental and economic stakes. However, the complexities of high-volume fracking, cross-jurisdictional impacts, and the contentious nature of the debate in New York should serve to encourage involvement and cooperation by the federal government, regional associations, and the state and localities.

New York’s revised draft SGEIS proposes an explicit mechanism for localities to participate in the well permitting process. Specifically, in communities that permit fracking, applicants for well permits would be required to negotiate with local officials to conform drilling plans to the town’s comprehensive plan (which serves as the backbone for local zoning laws), before the DEC approves the permit.<sup>101</sup> This presumes, however, that localities have sufficiently knowledgeable and professional staff to address fracking in their comprehensive plans, as well as to review well applications and negotiate with gas companies. John Nolon and Steven Gavin suggest that perhaps the state should go even further in its attempt at cooperative governance, by offering assistance to localities in drafting well-informed and appropriate planning documents.<sup>102</sup> They cite New York’s process for siting major electric generating facilities, where permit applicants contribute to a fund that enables affected local governments (among others) to hire experts to participate in the siting process.<sup>103</sup> The state does not appear to be disputing localities’ right to prohibit fracking within their jurisdiction, but seems to be searching for a way to give local units of government confidence that fracking can be conducted safely within their jurisdictions. As discussion in the subsequent section suggests, however, it is possible that the polarized nature of the debate may preclude meaningful local participation.



## Civic Engagement

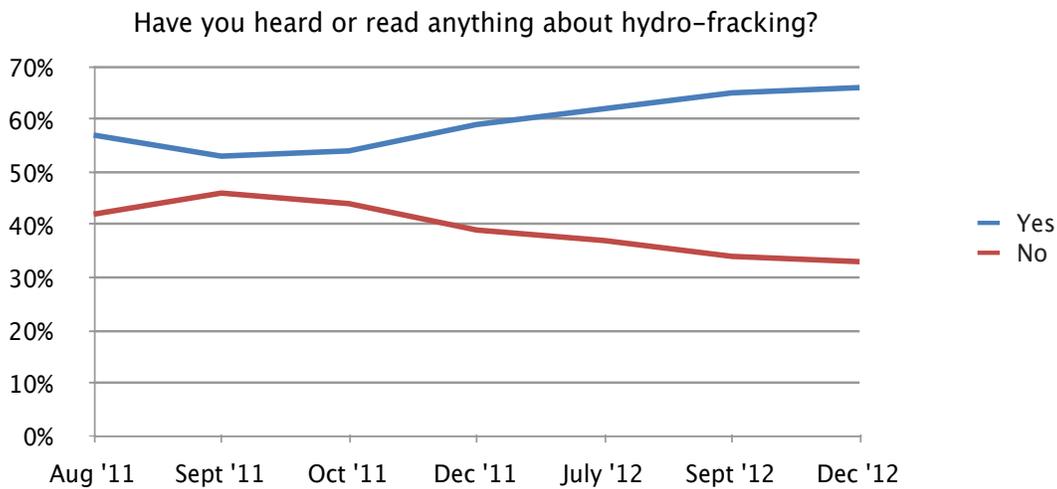
New Yorkers are deeply engaged in determining whether, and if so, how, fracking should proceed in the state. In addition to the public engagement in the DEC's regulatory process described above, the surfeit of local grassroots organizations formed explicitly to oppose or support fracking (but mostly the former) reflects New Yorkers' active participation.

As unconventional drilling methods, including fracking, led to greater production of natural gas, established environmental organizations—the Sierra Club, in particular<sup>104</sup>—supported fracking for natural gas as a “bridge” to more costly renewable energy sources. While these organizations advocated for strict drilling rules, little actual opposition to fracking existed in New York in the early 2000s. However, as fracking activity increased in Pennsylvania, residents in New York's adjacent Southern Tier began hearing anecdotal reports of contaminated drinking water, intrusive industrial activity, and community disturbances. Unlike New York's protracted and contentious process, Pennsylvania allowed fracking relatively expeditiously and many landowners signed leases with the gas industry with little understanding of what fracking would entail. When gas industry representatives began crossing the border into New York in 2008 seeking drilling leases, local residents felt that they—not the traditional environmental groups—would need to educate neighbors and their local governments about the risks of fracking, according to one of the grassroots movement's early leaders.<sup>105</sup>

The (primarily) opposition grassroots movement spread rapidly throughout New York, reaching nearly 40 distinct organizations, based on a review of Internet-based activity in summer 2013. The Southern Tier of New York has the highest concentration of organizations, but movements exist in towns with no real prospects for drilling, and in cities (e.g. New York City) whose watersheds could be implicated. Organizations are generally based around a local unit of government, for instance, “Town of Union Citizens Against Fracking,” “Fremont Concerned Citizens,” or “Save Spencer-VanEtten,” and though some have embraced other environmental sustainability issues, the vast majority formed in the past few years have been in reaction to the prospect of fracking. In addition to local, grassroots movements, celebrities and artists in New York have joined the anti-fracking cause. Actor Mark Ruffalo lives near the Delaware River and began speaking out publicly against fracking in 2011, drawing attention from the public and other celebrities to New York's pending decision.<sup>106</sup> In summer 2012, Yoko Ono and Sean Lennon founded a group, “Artists Against Fracking,” that has attracted the support of nearly 150 other famous artists, including musicians, authors, and actors. These public figures are focused nearly exclusively on fracking in New York, rather than nationwide. Many live in New York City or have homes nearby in upstate New York. Few if any, however, live in the more troubled western portion of New York where residents could see economic gains from leasing their land, leading to accusations of NIMBYism.<sup>107</sup>

Over time, the grassroots opposition movement has emerged nearly uniform in demanding a complete ban on fracking, with some local organizations seeking to criminalize fracking<sup>108</sup> and others focused specifically on water implications or landowners' rights. The opposition is largely related to the continued anecdotes (and emerging evidence) of adverse impacts from Pennsylvania, heightening the perception of risk from fracking.<sup>109</sup> Organizations have targeted the state regulatory process through lobbying, rallies, and petitions, effectively slowing down the issuing and reissuing of the SGEIS. Public comments submitted to the DEC in opposition to fracking far outnumbered those in support.<sup>110</sup> These organizations are also working simultaneously with local governments. An independent public interest organization catalogued over 200 local government actions in New York State, significantly more than any other state with fracking activity or potential. These actions generally constitute statutes that place a 12-month moratorium on any fracking activities, by authority of their municipal home rule law and regardless of a state decision to permit fracking.<sup>111</sup> Villages, towns, counties, and cities ranging from populations of 4,500 (Olive, NY) to over nine million (New York City) have passed varying versions of fracking bans, based on the unknown health, safety, and welfare risks to residents. Although this struggle is particularly widespread and prolonged, New York has seen such intergovernmental conflict before. Opposition from local government officials also characterized the debate over enactment of SEQRA, primarily after it passed the legislature but prior to being signed by the governor. Local officials were primarily concerned about state intrusion on local governments' home rule powers, particularly around land use and development<sup>112</sup>—the very same concerns that local residents (and governments) have about fracking.

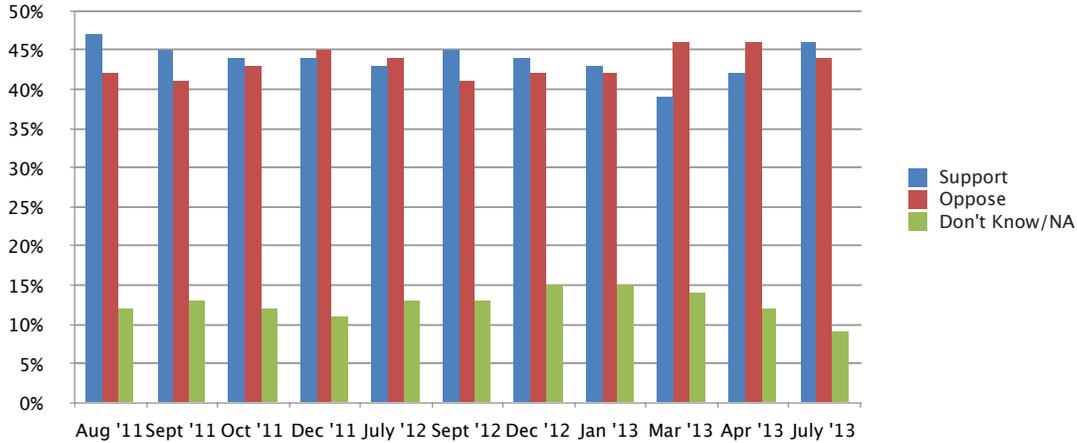
New Yorkers are not united in their opposition to fracking, however. A handful of grassroots organizations exist to support fracking in the state, for example, the “Joint Landowners Coalition of New York” and “Sullivan-Delaware Property Owners Association.” The gas companies and related professionals, and the trade association representing them—the Independent Oil & Gas Association of New York—are active in lobbying state government. Statewide polling has also shown persistent divisiveness on fracking. In early June, Quinnipiac University released a poll showing that 46 percent of New York voters support fracking, 44 percent oppose it, and nine percent were unsure. The phrasing of the question pits environmental concerns against economic benefits, and generally, Republicans, men, those without a college degree and who live upstate were more likely to support fracking. Siena College, in a separate poll with more neutral phrasing,<sup>113</sup> reports that between 15-20 percent of respondents persistently don’t have enough information, don’t know, or have no opinion, but still finds a stubborn and evenly divided public.<sup>114</sup> Although awareness of fracking has increased steadily since polling began in mid-2011, this stark divide in public opinion has persisted with neither support nor opposition breaking 50 percent of public opinion.<sup>115</sup>



Source: Quinnipiac University Polling Institute

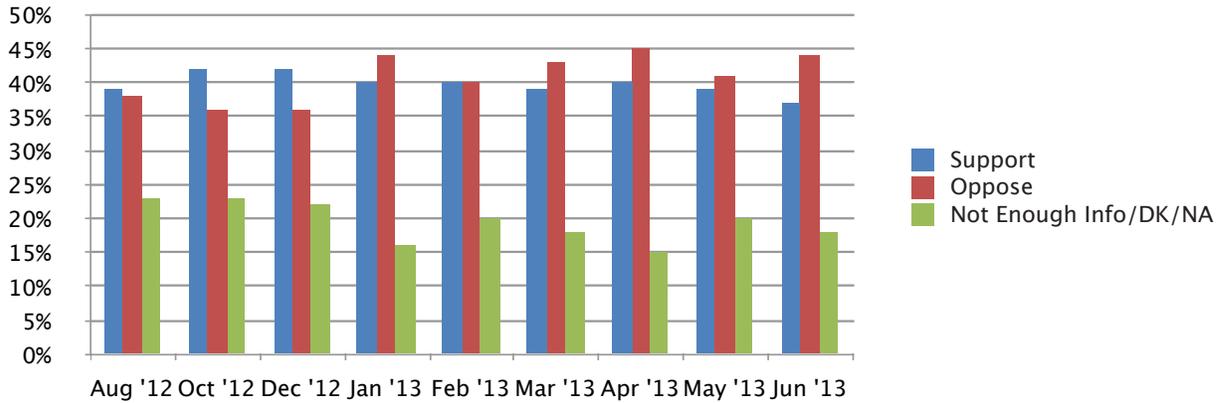


Some people say there should be drilling for natural gas in the Marcellus Shale because of the economic benefits. Others say there should not be drilling for natural gas in the Marcellus Shale because of the environmental impact. Which comes closer to your point of view?



Source: Quinnipiac University Polling Institute

Do you support or oppose the Department of Environmental Conservation allowing hydrofracking to move forward in parts of upstate New York?



Source: Siena Research Institute

## Conclusion

In deciding whether, and if so, how, to allow high-volume hydraulic fracturing to proceed, New York draws on its long history of balancing environmental protection with natural resource utilization. New York's abundant natural resources are a source of pride, enjoyment by residents, and economic gain through sustainable use, but have also suffered from harmful exploitation. In part, this experience drives New York's strong leadership on environmental conservation, as exemplified by its passage of SEQRA, an exceptionally strong "little NEPA." However, New York's Southern Tier—where fracking activity would be concentrated—is only slowly emerging from the Great Recession. Estimates for recoverable natural gas from the Marcellus Shale underlying New York are significant, and could lead to economic gains for residents, as well as to the state and local governments. These opposing pressures are evident in the regulatory process and illuminate why the process has been long and protracted.

Although the true costs and benefits of fracking in New York are largely uncertain, the state is learning from Pennsylvania's experience with fracking in the Marcellus Shale. Anecdotal reports and emerging evidence from Pennsylvania are largely serving as cautionary warnings to New York, and are catalyzing the local grassroots movement and even celebrities in opposition to fracking. The grassroots opposition movement is active at the local and state levels, both of which have important regulatory roles. The movement has been successful in enacting bans or moratoria on fracking at the local level, and prolonging the state's process to create a regulatory pathway for fracking. This citizen-led involvement appears unprecedented among other states that have confronted fracking and is driven by New Yorkers' exposure to the impacts of fracking in Pennsylvania, by the traditional environmental groups' reluctance to oppose fracking, and by the funding and publicity provided by celebrities who have joined (and sometimes spearheaded) the anti-fracking movement. Whether New York chooses to ban fracking, or proceeds after a contentious regulatory process with increasingly restrictive standards for environmental review, credit will largely be due to the swift approval and dramatic growth of fracking in Pennsylvania and the forceful reaction and approach of the opposition grassroots movement.

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## Appendix A: Common Acronyms

- DEC:** Department of Environmental Conservation (state); the New York state agency tasked with regulating oil and gas drilling since reorganization in the mid-20<sup>th</sup> century (see “Historical Perspective” > “Regulation of Natural Resources & Environmental Protection”).
- EIS:** Environmental Impact Statement; processes required by NEPA of relevant federal agencies mandated for all major federal actions (see “Historical Perspective” > “Regulation of Natural Resources & Environmental Protection”).
- GEIS:** Generic Environmental Impact Statement; finalized by the DEC in 1992, is a set of guidelines seeking to eliminate the need for site-specific EISs projected to have common environmental effects, which allows for more efficient permit issuance (see “Governance” > “State Regulatory Process”).
- NEPA:** National Environmental Policy Act (federal); law passed in 1970 establishing national environmental policy goals and processes for federal agencies to implement those goals; namely, environmental impact statements (EIS) (see “Historical Perspective” > “Regulation of Natural Resources & Environmental Protection”).
- RBC:** River Basin Commission (specifically, Delaware and Susquehanna); simultaneous interstate and state-federal compacts with independent regulatory jurisdiction over their respective boundaries pertinent to shale gas development (see “Governance” > “River Basin Commissions”).
- SEQRA:** State Environmental Quality Review Act (state); passed in 1975 requiring both state and local governmental units to account for the environmental impact of proposed activities in decision-making processes; is a state emulation of the federal NEPA (see “Historical Perspective” > “Regulation of Natural Resources & Environmental Protection”).
- SGEIS:** Supplemental Generic Environmental Impact Statement; issued by New York Governor David Paterson in 2008 attendant to the original GEIS to address permit issuance for high-volume fracking specifically (see “Governance” > “State Regulatory Process”).

## Endnotes

1. US Energy Information Administration. (2012, September 27). *Annual energy review*. Retrieved from <http://www.eia.gov/totalenergy/data/annual/index.cfm#naturalgas>
2. US Energy Information Administration. (2011). *Energy production estimates in physical units, 2011*. Retrieved from [http://www.eia.gov/state/seds/sep\\_prod/pdf/P1.pdf](http://www.eia.gov/state/seds/sep_prod/pdf/P1.pdf)
3. US Energy Information Administration. (2012, December 5). *AEO2013 early release overview*. Retrieved from [http://www.eia.gov/forecasts/aeo/er/pdf/0383er\(2013\).pdf](http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2013).pdf)
4. US Energy Information Administration. (2012, December 5). *Energy in brief: What is shale gas and why is it important?* Retrieved from [http://www.eia.gov/energy\\_in\\_brief/article/about\\_shale\\_gas.cfm](http://www.eia.gov/energy_in_brief/article/about_shale_gas.cfm).
5. New York State Department of Environmental Conservation. (n.d.). *New York's oil and natural gas history—A long story, but not the final chapter*. Retrieved from [http://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/nyserda2.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/nyserda2.pdf) (Hereafter referenced as “*Oil and natural gas history*”)
6. New York State Department of Environmental Conservation. (1992). *Generic impact statement on the oil, gas, and solution mining regulatory program (GEIS)*. Retrieved from <http://www.dec.ny.gov/energy/45912.html> (Hereafter referenced as “*1992 GEIS*”); New York State Museum, New York State Geological Survey. *Oil and gas*. Retrieved from <http://www.nysm.nysed.gov/nysgs/research/oil-gas/index.html> (Hereafter referenced as “*Oil and gas*”)
7. *Oil and natural gas history*.
8. Ibid.
9. *1992 GEIS*.
10. *Oil and gas*.
11. *1992 GEIS*.
12. Ibid.
13. *1992 GEIS; Oil and natural gas history*.
14. New York State. (2009, December). *New York State energy plan 2009: Natural gas assessment*. Retrieved from <http://www.nysenergyplan.com/Prior-State-Energy-Plans/2009stateenergyplan.aspx> (Hereafter referenced as “*Natural gas assessment*”)
15. New York State Department of Environmental Conservation. (n.d.). *Marcellus Shale*. Retrieved from <http://www.dec.ny.gov/energy/46288.html> (Hereafter referenced as “*Marcellus Shale*”)
16. US Environmental Protection Agency, Office of Research and Development,. (2010, June). *Hydraulic fracturing research study*. Retrieved from <http://www.epa.gov/safewater/uic/pdfs/hfresearchstudyfs.pdf>
17. Slater, B, Smith, L., & Nyahay, R. (2010). ‘*Unconventional*’ *oil and gas plays of New York State*. *New York State Geological Survey and Reservoir Characterization Group at the New York State Museum*. Retrieved from [http://esogis.nysm.nysed.gov/Talks/2010\\_EnE\\_Marcellus\\_Shale\\_Gas-Unconventional\\_Oil\\_Gas\\_New\\_York.pdf](http://esogis.nysm.nysed.gov/Talks/2010_EnE_Marcellus_Shale_Gas-Unconventional_Oil_Gas_New_York.pdf)
18. Mouawad, J. (2009, September 30). State issues rules on upstate natural gas drilling near city’s water. *New York Times*. (Hereafter referenced as “*State issues rules*”)
19. US Energy Information Administration. (1993, April). *Drilling sideways – A review of horizontal well technology and its domestic application*. Retrieved from <http://tinyurl.com/mb8eacr>
20. *Marcellus Shale*.
21. Andrews, A., Folger, P., Humphries, M., Copeland, C., Tiemann, M., Meltz, R., & Brougher, C. (2009, October 30). *Unconventional gas shales: Development, technology, and policy issues*. *Congressional Research Service*. (Hereafter referenced as “*Unconventional gas shales*”)
22. Montgomery, C. T., & Smith, M. B. (2010, December). *Hydraulic fracturing: History of an enduring technology*. *Journal of Petroleum Technology Online*, 26–41. Retrieved from <http://www.spe.org/jpt/print/archives/2010/12/10Hydraulic.pdf>; *Natural gas assessment*.
23. Reilly, S. (2013, July 6). *Natural gas production in NY decreased 15 percent last Year, new data shows*. *Press Connects*. Retrieved from <http://tinyurl.com/mz9xels>; Helman, C. (2011, July 20). *Fracking ban slashed New York nat gas production*. *Forbes*. Retrieved from <http://tinyurl.com/n6evq2a>
24. Soeder, D., & Kappel W. (2009). *Water resources and natural gas production from the Marcellus Shale*. *United States Geological Survey*. Retrieved from <http://pubs.usgs.gov/fs/2009/3032/pdf/FS2009-3032.pdf>
25. New York State Department of Environmental Conservation. (2011, September 7). *Revised draft Supplemental Generic Environmental Impact Statement (SGEIS) on the oil, gas, and solution mining regulatory program, 2011*. Retrieved from <http://www.dec.ny.gov/data/dmn/rdsgeisfull0911.pdf> (Hereafter referenced as “*Revised draft SGEIS 2011*”).
26. US Energy Information Administration. (2012). *Annual energy outlook (AEO)2012 early release overview*. Retrieved from [http://www.eia.gov/forecasts/aeo/er/pdf/0383er\(2012\).pdf](http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2012).pdf)



27. US Energy Information Administration. (2013, April-May). *Annual energy outlook (AEO)2013*. Retrieved from [http://www.eia.gov/forecasts/aeo/source\\_natural\\_gas\\_all.cfm#prodiq](http://www.eia.gov/forecasts/aeo/source_natural_gas_all.cfm#prodiq), Figure 91.
28. US Energy Information Administration. (2011). *Annual energy review 2011: Table 6.5. Natural gas consumption by sector, selected years, 1949-2011*. Retrieved from [http://www.eia.gov/totalenergy/data/annual/pdf/sec6\\_13.pdf](http://www.eia.gov/totalenergy/data/annual/pdf/sec6_13.pdf)
29. State of New York, Executive Chamber. (2008, July 23). *Governor Paterson signs bill updating oil and gas drilling law; pledges environmental and public health safeguards*. Retrieved from [http://s3.amazonaws.com/publica/assets/natural\\_gas/paterson\\_environment\\_080723.pdf](http://s3.amazonaws.com/publica/assets/natural_gas/paterson_environment_080723.pdf)
30. New York State Department of Environmental Conservation. (2008, August). *Catskill Park State Land master plan*. Retrieved from [http://www.dec.ny.gov/docs/lands\\_forests\\_pdf/cpslmp.pdf](http://www.dec.ny.gov/docs/lands_forests_pdf/cpslmp.pdf) (Hereafter referenced as “Catskill Park State Land master plan”)
31. New York State Adirondack Park Agency. Retrieved from <http://apa.ny.gov/index.html>
32. New York State Adirondack Park Agency. (2012, March). *Adirondack Park economic profiles*. Retrieved from <http://apa.ny.gov/Economy/Draft-LGD-FactSheet.pdf>
33. New York State Adirondack Park Agency. (2011, October). *Adirondack Park State Land master plan*. Retrieved from [http://apa.ny.gov/Documents/Laws\\_Regs/SLMP-20120201-Web.pdf](http://apa.ny.gov/Documents/Laws_Regs/SLMP-20120201-Web.pdf)
34. *Catskill Park State Land master plan*.
35. *Revised draft SGEIS 2011*.
36. New York State Department of Environmental Conservation. (n.d.). *Facts about New York State waters*. Retrieved from <http://www.dec.ny.gov/about/865.html> (Hereafter referenced as “Facts about New York State waters”)
37. US Geological Survey. (2013, May 23). *How much of your state is wet?* Retrieved from <http://ga.water.usgs.gov/edu/wetstates.html>
38. *Facts about New York State waters*.
39. New York State Department of Environmental Conservation. (n.d.). *Facts about the New York City watershed*. Retrieved from <http://www.dec.ny.gov/lands/25599.html>
40. New York State Department of Environmental Conservation. (n.d.). *Susquehanna River watershed* Retrieved from <http://www.dec.ny.gov/lands/48020.html>
41. A full list of acronyms used throughout this paper appears in Appendix A.
42. *1992 GEIS*.
43. Stevenson, S. M. (1982). Early legislative attempts at requiring environmental assessment and SEQRA's legislative history. *Albany Law Review*, 46, 1114-1127. (Hereafter referenced as “SEQRA's legislative history”)
44. Council on Environmental Quality. (2013, June 22). *State NEPA contacts*. Retrieved from [http://ceq.hss.doe.gov/state\\_information/States\\_NEPA\\_Like\\_22June2013.pdf](http://ceq.hss.doe.gov/state_information/States_NEPA_Like_22June2013.pdf)
45. New York State Department of Environmental Conservation. (n.d.). *SEQR: Environmental assessment in New York State*. Retrieved from <http://www.dec.ny.gov/permits/357.html>
46. N.Y. Env'tl. Conserv. Law. § 8-0109(8).
47. Orloff, N. (1981-1982). SEQRA: New York's reformation of NEPA. *Albany Law Review*, 46, 1128.
48. *Revised draft SGEIS 2011*.
49. Richardson, N., Gottlieb M., Krupnick, A., & Wiseman H. (2013, June). *The state of state shale gas regulation. Resources for the Future*. Retrieved from [http://www.rff.org/rff/documents/RFF-Rpt-StateofStateRegs\\_Report.pdf](http://www.rff.org/rff/documents/RFF-Rpt-StateofStateRegs_Report.pdf) (Hereafter referenced as “The state of state shale gas regulation”)
50. “Economic Assessment Report for the Supplemental Generic Environmental Impact Statement on New York's Oil, Gas, and Solution Mining Regulatory Program,” prepared by Ecology and Environment, Inc. for the NYS Department of Environmental Conservation, August 2011. [http://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/rdsgeisecon0811.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/rdsgeisecon0811.pdf)
51. White Paper on Taxation Issues Related to Gas Drilling. (2012). *Tompkins County Council of Governments, Gas Drilling Task Force, Assessment and Land Valuation Subcommittee*. Accessed July 15, 2013 at: <http://tinyurl.com/o5d82tv>.
52. 6 NYCRR Parts 52, 190, 550-556, 560, and 750. High-Volume Hydraulic Fracturing: Summary of Assessment of Public Comment. Accessed July 15, 2013 at: [http://www.dec.ny.gov/docs/administration\\_pdf/soaopc.pdf](http://www.dec.ny.gov/docs/administration_pdf/soaopc.pdf).
53. Paterson, D. A. (2010, January). *2010-11 executive budget briefing book*. State of New York. Retrieved from <http://www.budget.ny.gov/pubs/archive/fy1011archive/eBudget1011/fy1011littlebook/BriefingBook.pdf>
54. Paterson, D. A. (2010, January). *2010-11 executive budget economic and revenue outlook*. State of New York. Retrieved from <http://www.budget.ny.gov/pubs/archive/fy1011archive/eBudget1011/economicRevenueOutlook/economicRevenueOutlook.pdf>
55. Ecology and Environment, Inc. (2011, August). *Economic assessment report for the supplemental generic environmental impact statement on New York's oil, gas, and solution mining regulatory program*. Prepared for the NYS Department of Environmental Conservation. Retrieved from [http://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/rdsgeisecon0811.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/rdsgeisecon0811.pdf) (Hereafter referenced as “Economic assessment report for SGEIS”)

56. NYS Department of Labor. (n.d.). *Labor statistics for the Southern Tier region*. Retrieved from <http://www.labor.ny.gov/stats/sou/index.shtm>.
57. Navarro, M. (2012, April 10). For job seekers, a fracking fair. *New York Times*.
58. Navarro, M. (2012, May 3). Wastewater becomes issue in debate on gas drilling. *New York Times*.
59. *Economic assessment report for SGEIS*.
60. Christopherson, S. (2011). *The economic consequences of Marcellus Shale gas extraction: Key issues*. Community & Regional Development Institute, Cornell University. Retrieved from [http://www.greenchoices.cornell.edu/downloads/development/shale/marcellus/Economic\\_Consequences.pdf](http://www.greenchoices.cornell.edu/downloads/development/shale/marcellus/Economic_Consequences.pdf)
61. *Revised draft SGEIS 2011*.
62. Ibid.
63. Ibid.
64. Ibid.
65. Jackson, R., Vengosh, A., Darrah, T., Warner, N., Down, A., Poreda, R., Osborn, S., Zhao, K., & Karr, J. (2013). Increased stray gas abundance in a subset of drinking water wells near Marcellus Shale gas extraction. *Proceedings of the National Academy of Sciences Early Edition*. Retrieved from <http://www.pnas.org/content/early/2013/06/19/1221635110.full.pdf>
66. *Unconventional gas shales*.
67. Nolon, J., & Gavin, S. (2013). Hydrofracking: State preemption, local power, and cooperative governance. *Case Western Law Review*, 63(4), 995-1039. Retrieved from <http://law.case.edu/journals/LawReview/Documents/63CaseWResLRev4.3.Article.NolonGavin.pdf> (Hereafter referenced as “State preemption, local power”)
68. US Department of Energy. (2009, April). *Modern shale gas development in the United States: A primer*. Retrieved from [http://www.netl.doe.gov/technologies/oil-gas/publications/EPreports/Shale\\_Gas\\_Primer\\_2009.pdf](http://www.netl.doe.gov/technologies/oil-gas/publications/EPreports/Shale_Gas_Primer_2009.pdf)
69. *The state of state shale gas regulation*, Appendices.
70. *The state of state shale gas regulation*.
71. Navarro, M. (2010, December 9). NY objects to release of multistate fracking rules. *New York Times*.
72. Delaware River Basin Commission. (2013, July 18). Natural gas drilling index page. Retrieved from <http://www.nj.gov/drbc/programs/natural/>
73. Susquehanna River Basin Commission. (n.d.). *Frequently asked questions (FAQs)*. Retrieved from [http://www.srb.com/programs/natural\\_gas\\_development\\_faq.htm](http://www.srb.com/programs/natural_gas_development_faq.htm)
74. Phillips, S. (2013, May 8). *SRBC defends its limited role in overseeing water quantity*. State Impact, National Public Radio.
75. *Revised draft SGEIS 2011*.
76. New York State Department of Environmental Conservation. (n.d.). *Effect of federal Safe Drinking Water Act, Clean Water Act and Emergency Planning and Community Right-to-Know Act*. Retrieved from <http://www.dec.ny.gov/energy/46445.html>
77. *1992 GEIS*.
78. *Revised Draft SGEIS 2011*.
79. Transcript of Public scoping meeting for Supplemental Generic Environmental Impact Statement on DEC’s oil and gas regulatory program for the Marcellus Shale. (2008, November 6). Held at the Allegany Limestone Central School. Retrieved from [http://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/alegnydechrng.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/alegnydechrng.pdf)
80. New York State Department of Environmental Conservation. (2009, February 6). *DEC announces issuance of final scope for Marcellus Shale study*. Retrieved from <http://www.catskillmountainkeeper.org/our-programs/fracking/marcellus-shale/>
81. Ibid.
82. *Revised draft SGEIS 2011*.
83. New York City Department of Environmental Protection. (2009, September). *Rapid impact assessment report: Impact assessment of natural gas production in the New York City water supply watershed*. Prepared by Hazen and Sawyer, Environmental Engineers and Scientists. Retrieved from [http://www.nyc.gov/html/dep/pdf/natural\\_gas\\_drilling/rapid\\_impact\\_assessment\\_091609.pdf](http://www.nyc.gov/html/dep/pdf/natural_gas_drilling/rapid_impact_assessment_091609.pdf)
84. *State issues rules*.
85. Mouawad, J., & Krauss, C. (2009, October 27). Gas company won’t drill in New York watershed. *New York Times*.
86. Navarro, M. (2009, November 27). At odds over land, money and gas. *New York Times*.
87. Navarro, M. (2012, March 30). Upstate vs. Downstate: A slow boil over water issues. *New York Times*.
88. Paterson, D. A. (2010, December 13). *Executive Order No. 41: Requiring Further Environmental Review*. State of New York.
89. Navarro, M. (2012, January 27). New York’s fracking deliberations inch along. *New York Times*.
90. Hakim, D. (2012, June 13). Cuomo proposal would restrict gas drilling to a struggling area. *New York Times*.



91. Weaver, T. (2013, May 23). Cuomo will make decision on hydrofracking before next year's election. *Syracuse.com*. Retrieved from [http://www.syracuse.com/news/index.ssf/2013/05/cuomo\\_seneca\\_talks\\_have\\_stalle.html](http://www.syracuse.com/news/index.ssf/2013/05/cuomo_seneca_talks_have_stalle.html)
92. Kenneally, M. & Mathes, T. (2010). Natural gas production and municipal home rule in New York. *New York Zoning Law and Practice Report*, 10(4). Retrieved from <http://catskillpost.files.wordpress.com/2011/06/nyszoninglawrpt-naturalgasproduction.pdf>
93. *State preemption, local power.*
94. State of New York, Supreme Court Appellate Division, Third Judicial Department. (2013, May 2). *In the matter of Norse Energy Corporation USA v Town of Dryden, et al.*
95. FracTracker Alliance. (2013, September 6). *Current high volume horizontal hydraulic fracturing drilling bans or moratoria in NY State.* Retrieved from <http://www.fracktracker.org/maps/ny-moratoria/>
96. Batson, B. (2013, June 12). Rockland legislature bans radioactive fracking waste. *Nyack News & Views*.
97. Prezioso, J. & McAllister, E. (2013, May 2). New York state court upholds town zoning laws to ban fracking. *Reuters*.
98. Urbina, I. (2011, December 1). Learning too late of the perils in gas well leases. *New York Times*, U.S Section. Retrieved from <http://www.nytimes.com/2011/12/02/us/drilling-down-fighting-over-oil-and-gas-well-leases.html?pagewanted=3>
99. Stech, K. (2013, May 20). New York landowners sue Norse Energy USA over leases. *Dow Jones Newswires*. Retrieved from <http://tinyurl.com/oub8ogv>
100. McAllister, E. (2013, August 6). Chesapeake drops energy leases in fracking-shy New York. *Reuters*.
101. *Revised draft SGEIS 2011.*
102. *State preemption, local power.*
103. *Ibid.*
104. Sierra Club. (2012, July-August). Clearing the air on natural gas. *Sierra Magazine*. Retrieved from <http://www.sierraclub.org/sierra/201207/pennsylvania-fracking-shale-gas-200-sidebar.aspx>
105. EcoWatch Magazine. (2013, June 19). Influence of grassroots anti-fracking movement spreads like wildfire. *EcoWatch*. Retrieved from <http://ecowatch.com/2013/influence-grassroots-anti-fracking-movement-like-wildfire/>
106. Navarro, M. (2011, December 2). Ruffalo embraces a role closer to home. *New York Times*. Retrieved from <http://tinyurl.com/kmlktrt>
107. Begos, K. & Peltz, J. (2013, March 15). Anti-fracking celebrities, such as Yoko Ono, Mark Ruffalo and others, put 'fractivism' in the spotlight. *Huffington Post*. Retrieved from <http://tinyurl.com/k2dqalc>
108. See, for example, the Sovereign People's Action Network at <http://www.sovereignpeople.net/index.html>.
109. Applebome, P. (2012, January 9). Drilling critics face a divide over the goal of their fight. *New York Times*. Retrieved from <http://tinyurl.com/kjkcmlm>
110. *Ibid.*
111. Food & Water Watch. (n.d.). *Local actions against fracking*. Retrieved from <http://www.foodandwaterwatch.org/water/fracking/fracking-action-center/local-action-documents/>
112. *SEQRA's legislative history.*
113. "Do you support or oppose the Department of Environmental Conservation allowing hydrofracking to move forward in parts of upstate New York?"
114. Siena Research Institute. (2013, June 17). Siena college poll: *Majority of voters think silver should step down as speaker*. Retrieved from <http://tinyurl.com/m4fcfl>
115. Quinnipiac University. (2011, August 11). *New York voters back fracking, despite concerns, Quinnipiac University poll finds*. Retrieved from <http://tinyurl.com/lqjklzb>

# The Center for Local, State, and Urban Policy

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