

TOWARD AN EVIDENCE-BASED FRACKING DEBATE

**Science, Democracy, and Community Right to Know
in Unconventional Oil and Gas Development**

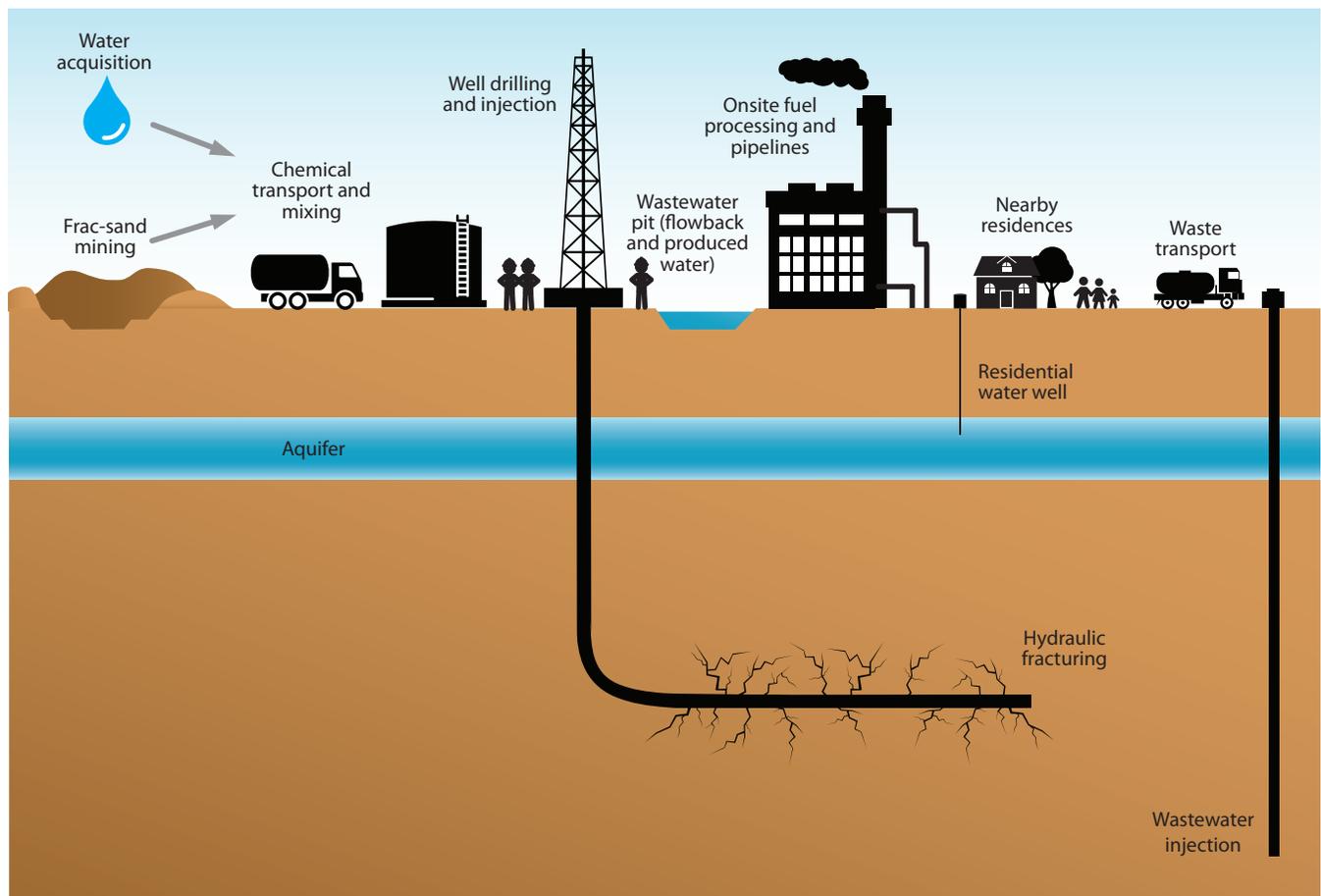


The advent of hydraulic fracturing—commonly known as “fracking”—and other technological advances such as horizontal drilling have resulted in the rapid expansion of “unconventional” oil and gas development. These technologies have enabled the extraction of oil and gas from shale and other tight rock formations that had been previously inaccessible or deemed uneconomic to tap. While these techniques have been used for several decades to extract oil from shale in Texas and elsewhere, this recent expansion has created new risks in new places—including some 28 states from Pennsylvania and California to North Dakota and Alaska. The result is clear: the rapid and widespread growth of unconventional oil and gas development has outpaced the public’s and policy makers’ ability to make informed decisions about the best way to ensure the health and prosperity of their communities.

Communities across the country, including many that have never seen gas or oil development, are now faced with difficult decisions as companies seek to purchase the rights to pursue these newly available oil and gas resources. Promises of economic growth and community revitalization have led many states and local communities to embrace development. At the same time, communities are worried about the risks that come along with any benefits, as well as about the unequal distribution and short-lived duration of economic benefits. *Will my drinking water be contaminated? Will I experience related health problems? What will happen to the social fabric of my community? Will I be exposed to the risks without receiving the benefits of such development?*

The science behind unconventional oil and gas development is complex and interdisciplinary (Figure 1). Although impacts of development have not been uniformly

FIGURE 1. ILLUSTRATION OF TYPICAL STEPS OF UNCONVENTIONAL OIL AND GAS DEVELOPMENT



Although hydraulic fracturing has been done for several decades in vertical wells as well as in horizontal wells for oil, the scale, number of wells drilled, and technology involved has advanced rapidly in the last few years and it is also now heavily deployed for extraction of natural gas. This expansion has opened up development of many oil and gas resources previously thought inaccessible (EPA 2013c).

BOX 1

A Toolkit for Community Decision Making



Along with this report, we have developed a toolkit for active citizens and policy makers faced with decisions about unconventional oil and gas development in their communities. By providing practical advice and resources, the toolkit helps citizens identify critical questions to ask, and obtain the scientific information they need to weigh the prospects and risks in order to make the best decisions for their community.

To make sound decisions about unconventional oil and gas development, we need independent science to play a stronger role in informing public dialogue. The toolkit can aid informed public discussions and decision making about fracking in communities by helping citizens to:

- identify critical issues about the potential impacts of fracking in their area and be able to search for answers;
- distinguish reliable information from misinformation—and help their neighbors and local decision makers do the same;
- communicate with scientists, media, policy makers, and local groups to be a part of the public discussion; and
- learn about and engage with the key actors in their community to influence oil and gas policy making at a local and state level.

To read or print the toolkit, go to www.ucsusa.org/HFtoolkit.

experienced in all locations, evidence suggests that unconventional oil and gas development may pose significant risks across different locations or types of wells. From drinking water contamination to air pollution concerns to socioeconomic impacts, these risks are discussed in this report.

But the dizzying pace of unconventional oil and gas development has limited the time available for researchers to adequately study its impacts. Scientific unknowns about some of the impacts of development have converged with a lack of comprehensive legal requirements

and interference in the science and policy processes by special interests.

The confluence of conflicted politicians, biased or unavailable science, and misinformation has produced a noisy information landscape that too often hinders citizens seeking reliable information and erects hurdles for communities seeking evidence-based decisions (Figure 2, p. 4). This report highlights these barriers—interference in the science, inadequate governance, and a noisy public dialogue—and offers recommendations to help surmount them.

FIGURE 2. HURDLES TO SCIENCE-INFORMED DECISION MAKING ON FRACKING



The rapid growth of unconventional oil and gas development has outpaced the public's ability to make informed decisions about the best way to ensure healthy, prosperous communities. Understanding the barriers and how to overcome them can empower communities to make more evidence-based decisions about fracking.

A Lack of Transparency

Communities need access to reliable information from trusted sources in order to make informed decisions about unconventional oil and gas development. But companies have been tight-lipped in many of their activities and governments have been less than transparent in their decision-making processes. In many cases, the industry and government have failed to fully and pre-emptively engage the local communities affected by oil and gas development.

Industry has tended to dismiss the risks associated with fracking and resist disclosure of information about the chemicals used and the technological practices employed.

Most companies, for example, do not fully disclose the chemical composition, volume, and concentration of the chemicals they use in their operations, arguing that some of these details are proprietary (i.e., the company believes this information could damage its business interests if disclosed). This information should be made publicly available online before drilling begins. Further, the chemical composition of “flowback” and other wastewater in every locality should also be publicly disclosed. Public safety must be prioritized over company trade secrets.

Restricted Access to Scientific Information

Scientists researching the effects of unconventional oil and gas development have met challenges in obtaining measurements

and other necessary information because of legal settlements that conceal scientific information, trade secret exemptions in chemical disclosure laws, restricted access to well sites, and limited sharing of data by industry and government officials (Colborn et al. 2011; Zielinska, Fujita, and Campbell 2011).

Many of the scientific studies conducted are not available to researchers. Lawsuits surrounding potential pollution of residences by oil and gas activities almost always end in non-disclosure agreements (Efstathiou and Drajem 2013). These agreements conceal any data or analysis that was done to determine if the pollution was caused by the industrial activity. They not only prevent the affected citizens from speaking about the incident but also suppress valuable scientific information that could bring better understanding of the risks associated with oil and gas development (see Box 2, p. 6).

Further, without strong chemical disclosure laws in place, it is more challenging for scientists to detect pollution when it occurs and study its potential impacts on the environment and human health. Many jurisdictions have no requirement that companies publicly disclose this information, leaving researchers to negotiate with companies themselves to obtain what data they can. Even where some chemical disclosure is legally required, companies often are allowed to withhold the information they consider to be industry trade secrets (Richardson et al. 2013).

Researchers have also faced barriers when they seek to take measurements themselves. Environmental monitoring data provide scientists with important information in assessing environmental and public health impacts of an industrial activity. Most well sites, however, are on private land, much of which is owned by or leased to the companies doing the oil and gas extraction (Christopherson 2013). Thus, companies can restrict researchers from collecting data and obtaining other information vital for scientific study (Colborn et al. 2011; Zielinska, Fujita, and Campbell 2011). For example, one research professor studying air quality around well sites noted that her research team was only able to conduct “fence studies”—that is, take measurements outside fenced perimeters of well sites—because companies would not allow her team to test the air within the site (Zielinska, Fujita, and Campbell 2011).

Situations such as these significantly hamper the level and quality of monitoring that scientists can conduct. In addition, these restrictions could inhibit pre-drilling monitoring, which provides communities with baseline information about their air and water quality. Such baseline studies help communities detect any pollution caused in the course of oil and gas operations and help hold companies legally accountable for damages.

Improving Access to Information

Decision makers and the public can only make informed decisions when the best available science—about the health and environmental effects of hydraulic fracturing, wastewater disposal, and other community impacts—is made publicly accessible. Robust and ongoing scientific research is needed to understand these impacts, spanning all the processes involved in hydraulic fracturing, including the disposal of hazardous waste. Science can inform communities about such effects, but research must be fast-tracked and made publicly accessible.

Baseline studies help communities detect any pollution caused by oil and gas operations and help hold companies legally accountable for damages.

To improve transparency about unconventional oil and gas extraction and its effects, companies should be required to collect and publicly disclose three key sets of data: first, baseline studies of air, water, and soil quality before drilling begins; second, ongoing monitoring of air, water, and soil quality during and after extraction activities; and third, disclosure of the chemical composition, volume, and concentration of the chemicals they use in their operations. Such concrete data will allow scientists to quantify the short-term and long-term effects of unconventional oil and gas development, empower citizens with reliable information on their environmental quality, and help hold those responsible for pollution in communities accountable.

In addition, the government can play a greater role in promoting transparency in oil and gas operations. Federal agencies and state and municipal governments should:

- collect representative and robust environmental and health data for affected communities, or require companies to do so;
- conduct comprehensive studies to assess the health and environmental risks;
- make the data, research results, and other information related to unconventional oil and gas production publicly accessible; and
- engage citizens to understand and address their concerns about the impacts of unconventional oil and gas development in a meaningful way.

Misinformation and Interference in the Science

The high profit potential of oil and gas development, combined with a lack of scientific knowledge or solid plan for future research, has left science on the health, environmental,

and socioeconomic effects vulnerable to undue influence and interference from political and corporate forces. These factors also have increased the prevalence of misinformation in the public dialogue. Together, such challenges have created barriers for citizens, researchers, members of the media, and decision makers seeking reliable scientific information on the risks associated with unconventional oil and gas development. Already, this current state has led to several instances of

inappropriate corporate influence over both government and academic studies of hydraulic fracturing.

Government Science

One major target of corporate interference in the science around hydraulic fracturing has been the U.S. Environmental Protection Agency (EPA), which has been studying unconventional oil and gas development for many years. EPA studies

BOX 2

Hidden Science and Silenced Citizens in Legal Settlements

There are still many unknowns related to water contamination from oil and gas operations, perhaps partly due to the silencing of those who have experienced such contamination of their drinking water. While more scientific research is needed, some information about potential water contamination is known but concealed from public view by industry actors who prefer to keep the details hidden.

Residents who suspect contamination of their water due to oil and gas activities may sue the company they believe is responsible. The majority of these lawsuits end with a settlement or property buyout, in which citizens are compensated for any damages found to result from industry activity in return for their silence on the incident. Such non-disclosure agreements legally prohibit citizens from speaking about the case and the events surrounding it. As a result, many of the scientific investigations of water contamination that have been performed are hidden from public scrutiny. This means that even if testing of water and other scientific analyses performed for the court case indicated contamination caused by oil and gas activities, the information is not shared with researchers, regulators, and the community. Non-disclosure agreements are a substantial barrier to scientists and public health experts seeking to advance knowledge and understanding of the risks associated with unconventional oil and gas development (Efsthathiou and Drajem 2013).

The secrecy surrounding legal settlements (in addition to exploitation of discrepancies in definitions of fracking) has made it easier for industry actors to claim there are no examples of groundwater contamination from unconventional oil and gas development, since much of the data on which this statement should be based are not publicly known. “There has never been a case of groundwater contamination as a result of hydraulic fracturing,” Jack Gerard, president of the American Petroleum Institute, stated in an interview with Bloomberg Radio in April 2013 (Efsthathiou and Drajem 2013). He is not alone—many industry representatives have made similar claims in public interviews, in town hall meetings, and in congressional hearings (USHR 2013; USS 2013; Urbina 2011).

Another concerning element of such settlements is that—in at least one case—the non-disclosure agreement may apply to the children of a family involved in the lawsuit. Chris and Stephanie Hallowich, who experienced health impacts potentially caused by gas drilling near their Washington County, Pennsylvania, home, settled the dispute with Range Resources, the company allegedly responsible for the damages. The settlement included a non-disclosure agreement that seems to bar the couple’s seven- and 10-year-old children from speaking about the experience for the rest of their lives (Breiner 2013). Though Range Resources has since disputed that the disclosure applies to the two children, the settlement transcript itself indicates that the company’s lawyers intended the agreement to “apply to the whole family” (Breiner 2013; Stephanie Hallowich and Chris Hallowich v. Range Resources et al. 2011).



inform federal policy makers on environmental pollution and thus play a large role in how industry is regulated. In several recent instances when potential water contamination warranted an EPA investigation, industry actors pressured the agency, and the EPA subsequently stepped back.

For example, the EPA was investigating a water contamination case in Parker County, Texas, when industry may have intervened. After home owners reported methane gas in their well water, the EPA ordered the company allegedly responsible, Range Resources, to provide affected residents with safe drinking water, and to clean up the water wells. When the company refused, the EPA sued them for non-cooperation. Subsequently, however, the EPA dropped the lawsuit (Plushnick-Masti 2013). According to a report obtained by the Associated Press, the EPA had scientific evidence against Range Resources, but dropped the case because the company threatened not to cooperate with another EPA study of fracking. E-mail messages obtained by EnergyWire show that Pennsylvania Governor Edward G. Rendell met with EPA Administrator Lisa P. Jackson about a year before the case was dropped, and argued on behalf of Range Resources that the case be settled (Soraghan 2013).

In another recent incident, the EPA was investigating potential drinking water contamination in Dimock, Pennsylvania. The company in question, Cabot Oil and Gas Corp., was highly critical of the EPA's involvement; it accused the EPA of lacking appropriate knowledge and misrepresenting data. Subsequently, the EPA concluded that the dangerous levels of chemicals in the water could be reduced to safe levels with water treatment systems, and that there was no need for any further study of the case (StateImpact 2013). But in July 2013, a leaked internal EPA PowerPoint presentation by the EPA office working on the Dimock case indicated that the chemicals may still be at unsafe levels. The presentation reported results from more than four years of water quality testing in 11 wells and concluded that "methane and other gases released during drilling . . . apparently cause significant damage to the water quality" (Banerjee 2013).

Academic Studies

In addition to government science, industry interests have exerted influence on academic studies of unconventional oil and gas development, using academia to generate studies favorable to their business development. Such efforts have generally ignored or disparaged information and have produced industry-friendly research results and reports coming from several universities, a circumstance that has been dubbed "frackademia" (Schiffman 2013; Horn 2012).

Industry funding of academic research does not inherently mean the science is biased. Private sources often fund research

at academic institutions. However, it is essential that such research studies list funding sources, disclose any conflicts of interest held by study authors, and examine all evidence objectively.

For several fracking studies released with university affiliations, ties to industry were not disclosed. At the University of Texas at Austin, for example, a 2012 study titled *Fact-Based Regulation for Environmental Protection in Shale Gas Development* (Groat and Grimshaw 2012) was met with strong criticism after it was revealed that the lead author failed to disclose that he received material compensation through his affiliation with Plans Exploration and Production, an energy industry firm with an interest in fracking. In response to the controversy, the university requested an external review of the study.

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The review concluded that the study "fell short of contemporary standards for scientific work" (Augustine et al. 2012).

In another high-profile incident, the State University of New York at Buffalo was forced to close the school's Shale Resources and Society Institute, in response to internal and external criticism about an improper relationship between some of the institute's professors and the natural gas industry (Navarro 2012a; Tripathi 2012). One study by the institute falsely claimed that fracking-related pollution events in Pennsylvania had declined in recent years and failed to reveal that the authors had strong ties to the oil and gas industry, and regularly received funding for their studies from the Marcellus Shale Coalition, an industry trade association (Navarro 2012b).

Legal Limitations and Loopholes

As hydraulic fracturing has expanded rapidly, state and federal regulations have struggled to keep up. Outdated laws create regulatory gaps in covering hydraulic fracturing operations. Where new laws have been passed, they are frequently limited in scope or contain loopholes for the oil and gas industries that diminish their effectiveness, sometimes as a result of industry influence. One study found that between 2001 and 2011 the natural gas industry spent nearly \$750 million in federal lobbying and political contributions to members of Congress to fight regulatory oversight of hydraulic fracturing (Browning and Kaplan 2011). This lack of laws has been coupled with the

weak role that federal agencies have taken more generally with regard to the scientific study, management, monitoring, and enforcement of the laws that do exist.

Inadequate Federal Regulation

Many federal laws that would govern activities around hydraulic fracturing have loopholes that exempt the oil and gas industry from regulation. One major exemption is in the 1974 Safe Drinking Water Act (SDWA) (EPA 2012a). This act is the major federal law protecting sources of drinking water in the United States and includes a section that regulates the injection of fluids into the ground that pose a risk of contaminating sources of drinking water (EPA 2012b). Most hydraulic fracturing operations are exempt from regulation under the SDWA and some parts of the Clean Water Act because of a provision inserted in the Energy Policy Act of 2005 commonly known as the “Halliburton loophole” (EPA 2012c).

Evidence suggests that the Halliburton loophole, in addition to other exemptions for the oil and gas industry in the Energy Policy Act of 2005, was put into the law by oil and gas interests. The act also included exemptions for the oil and gas industry in the Clean Air Act and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The exemptions to all four of these laws were recommended by the Energy Policy Task Force, a team of experts convened during the George W. Bush administration to advise on energy policy issues (Phillips 2011). The task force was chaired by Vice President Richard “Dick” Cheney, who served from 1995 to 2000 as chairman and CEO of Halliburton Co., one of the largest companies engaged in unconventional oil and gas development. As a consequence of the Energy Policy Act of 2005, the EPA cannot regulate the majority of hydraulic fracturing operations.

In part to address this regulatory gap, the Bureau of Land Management (BLM) released a revised version of new regulations for hydraulic fracturing on public and tribal lands in May 2013 (BLM 2013a). However, a close look at the BLM rules reveals that they fall significantly short of full, public disclosure in a timely and accessible manner. The rules, which apply to fewer than half of all oil and gas wells, do not make full disclosures available to the public, because a provision allows companies to refrain from disclosing the identities of chemicals that are trade secrets. The disclosed chemicals are posted on the website FracFocus, an online database that has been criticized for storing data in an inaccessible manner (Konschnik et al. 2013). Finally, the rules have no requirement to disclose the chemical contents of the wastewater—both flowback and “produced water”—that comes back out of wells. Thus, the public would have no information about the salinity, radioactivity, or concentration of other hazardous substances present in the wastewater. This provision leaves the public to guess the



Without strong federal laws in place, regulation of hydraulic fracturing happens largely at the state level. State laws governing the practice vary widely in how much the industry is regulated.

wastewater composition based on the company’s incomplete disclosures of the chemicals that were originally put into the well—information that will only be available once drilling is already complete.

A Patchwork of State and Local Laws

As a result of the inadequate federal role, much of the regulation of oil and gas wells is governed by laws of the state where the drilling takes place. State laws regulating hydraulic fracturing operations are a patchwork of old and new rules, with important protections frequently absent or weakened by exemptions. As of September 2013, 28 states have at least some hydraulic fracturing within their borders, but far fewer than 38 states have strong laws on chemical disclosure and water and air quality monitoring around unconventional oil and gas operations (Bradner 2013; Kiparsky and Hein 2013; Richardson et al. 2013).

On chemical disclosure, nine states with drilling inside their boundaries do not have any laws regulating disclosure of chemicals (Richardson et al. 2013). Some companies inside those states do voluntarily disclose information about the chemicals they use (FracFocus 2013). However, without a law making disclosure mandatory, it is impossible to verify the completeness and accuracy of the disclosures. As of September 2013, 16 states had a chemical disclosure law of some kind, and three more have proposed—but not passed—disclosure laws (Bradner 2013; Richardson et al. 2013; Wernau 2013). The laws, however, frequently fall short of full, public disclosure occurring in a timely and accessible manner.

The shortcomings of chemical disclosure laws mean that citizens do not know what chemicals are being used, and that medical personnel and first responders do not have ready access to information necessary to effectively respond during emergency situations. In 2008, for example, emergency room nurse Cathy Behr came close to death from her exposure to hydraulic

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fracturing fluid. The company that produced the fluid refused to reveal the chemicals used in its fluid because they were considered trade secrets. Eventually, Behr's doctors were able to save her but without knowledge of the chemicals with which she had come into contact (Tsou 2012; Greene 2008).

With respect to air and water quality monitoring, a majority of states with unconventional oil and gas development do not have laws requiring monitoring near drilling sites. The laws that do exist are often weak or limited. Moreover, most operations have not completed environmental impact assessments, so even this basic level of information is not available to the public. Some states have conducted limited monitoring studies around well sites; however, these campaigns are no substitute for the comprehensive monitoring program necessary to detect and

understand the environmental and public health impacts of unconventional oil and gas development.

Some regulation of unconventional oil and gas development also occurs at tribal and local levels. For example, local municipalities often can implement zoning laws, road use agreements, and land use ordinances, such as setback requirements and noise mitigation. Some jurisdictions have implemented bans or moratoria on all oil and gas development within their boundaries.

A Need for Comprehensive Laws

Strong, well-crafted laws and regulations can play an important role in filling information gaps, advancing scientific knowledge, and protecting the public. Laws requiring companies to disclose—in a full, timely, and publicly accessible fashion—the chemicals used in hydraulic fracturing, as well as the composition of wastewater, can overcome incomplete voluntary disclosures. Laws requiring the monitoring of water and air quality near drilling sites—before and after drilling—can ensure that a capable party is collecting the necessary data and has access to the places needed to collect the data. In its final report, the Secretary of Energy Advisory Board's Shale Gas Production Subcommittee recommended such laws, which it believed “would assure that the nation's considerable shale gas resources are being developed responsibly, in a way that protects human health and the environment, and is most beneficial to the nation” (SEAB 2011).

Loopholes in federal and state environmental legislation that exempt oil and gas development must be closed. Major exemptions exist in several federal laws including the Safe Drinking Water Act, the Clean Water Act, the Clean Air Act, and the Toxic Release Inventory of the Emergency Planning and Community Right-To-Know Act. Strengthening these laws will allow the federal government to better protect the public from risks associated with unconventional oil and gas development, and to provide better oversight and assistance to states and municipalities whose resources are often too limited to adequately meet the challenge.

Best Practices for Empowering the Public

Here we explore obstacles citizens encounter in their search for answers and highlight ways of cutting through the challenges of today's noisy information landscape.

Many, if not most, Americans today get their information about unconventional oil and gas development by searching the Internet. In 2013, 85 percent of adults in the United States are online. Among younger adults aged 18 to 29, 98 percent are online (Pew Internet 2013). Finding information necessitates sorting through search engine results that are not ranked in order by reliability. Using targeted search terms and having



More comprehensive laws governing hydraulic fracturing at the federal, state, and local level can help drive us toward a more transparent and informed discussion on unconventional oil and gas development in the United States.

the patience to sift through online search results beyond the first few pages can help locate reliable information. Without refining their online searches, however, citizens seeking to learn more about fracking may encounter, first and foremost, websites and articles of questionable accuracy and objectivity instead of objective, science-based information.

To maximize the chance of finding and effectively using reliable information online, citizens can employ several strategies outlined below.

Without refining online search terms to include agency names, citizens seeking to learn more about fracking may encounter, first and foremost, websites and articles of questionable accuracy and objectivity.

Find Government Sources

Government sources usually provide objective, accessible information resources for the American public. Federal agencies, as well as state and municipal websites, can be good sources. Federal agencies tend to better address questions about potential community impacts, while states and municipalities generally do a better job of addressing questions about where and how drilling occurs.

In practice, government information can be limited in scope, hard to locate, or nonexistent. Federal agencies, for example, do not generally appear in the top rankings in Internet search engine results unless their names or initials are included with

search terms. The EPA did rank highly in a search of the term hydraulic fracturing; however, even this agency did not make it into the first five pages of a normalized Google search of the term fracking, which is the more common search term (Figure 3). In fact, not a single federal or state government website appeared in the first five pages of results in a Google search for the term fracking (Google Trends 2013).

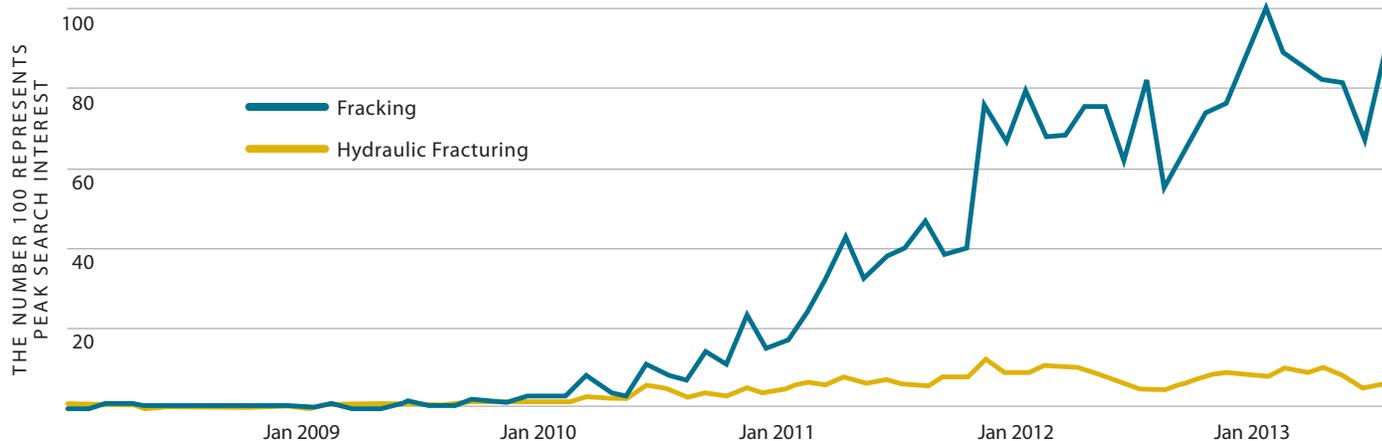
To locate government sources, citizens should search on the term hydraulic fracturing rather than fracking and include the agency name in the search. The public can take these simple steps to refine search results and find government information more efficiently. In turn, government agencies should consider ways to maximize their own visibility to the public.

Carefully Navigate Media Sources

Since many citizens may never look beyond news sources to learn about unconventional oil and gas development, an informed public dialogue depends on accurate and unbiased reporting. Journalists are faced with the task of getting the science and technology right, translating technical evidence for lay audiences, making sense of uncertainty, and sorting fact from misinformation in debates.

Robust and well-researched reporting on scientific uncertainties can promote informed decision making. Policy makers and the public are hungry for answers and concrete recommendations, yet many science-based questions about unconventional oil and gas development remain unanswered. Finding trustworthy information about uncertainties is particularly challenging, since both supporters of and opponents to unconventional oil and gas development tend to downplay or exaggerate knowledge gaps.

FIGURE 3. GOOGLE SEARCH TRENDS FOR THE WORDS “FRACKING” AND “HYDRAULIC FRACTURING”



The public should look for stories that neither stoke nor dismiss concerns but accurately represent the work scientists are doing to advance understanding and reduce uncertainties around unconventional oil and gas development. Citizens should recognize the role their own biases and preconceptions can play when evaluating information, particularly when uncertainty is high. The media practices below can help promote an informed public conversation.

- Help readers assess scientists' credibility by identifying their credentials and funding sources
- Provide links and citations to primary sources so readers can verify the accuracy of assertions for themselves
- Focus on what the science says and does not say without jumping to policy conclusions
- Create a public space for scientists to speak about their work in their own words
- Highlight the need for more scientific research to answer unanswered questions
- Encourage the public to be objective and explore viewpoints with which they may disagree
- Explain—without exaggerating—the complex relationship between uncertainty and risk

Watch Out for Misinformation

One of the biggest challenges communities face in making decisions about unconventional oil and gas development is sorting through and assessing the reliability of information about risk. Different information sources report and weigh risk differently; similarly, different segments of the public receive and view risk information differently. Citizens must carefully navigate through materials from different stakeholder groups in the fracking debate to obtain and understand their perspectives while also steering clear of misinformation.

Information on all sides of the issue can be “cherry-picked” or skewed. Misinformation is rarely present in the pure form of entirely false statements or fabricated evidence. It comes in varying degrees of seriousness and can include half-truths, misleading phrases or images, distortions of numbers and statistics, omissions of key points, misrepresentations of research, and quotes taken out of context (Brown 2012). Even when no misinformation is present, many factors influence how information reaches and is received by citizens. According to science communication experts, cultural values (Kahan 2013), media and social context (Sheufele 2013), and language choices (Ross 2013) all play a role.

FIGURE 4. CITIZENS' SOURCES OF INFORMATION ON UNCONVENTIONAL OIL AND GAS DEVELOPMENT





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The public has a right to know about all the risks and benefits that could come with unconventional oil and gas development. Greater transparency in industry operations and government decision making are needed for a science-informed dialogue.

For example, some stakeholders and special interests downplay, dismiss, or ignore information and concerns about risks to human health or the environment. Other stakeholders have exaggerated risks to mobilize public sentiment against unconventional oil and gas development. Stakeholders on both sides may skip over nuances, uncertainties, limitations, and caveats of scientific studies or quote sections out of context as evidence to support claims that the research may not.

Seek Out More Objective Sources

One oft-overlooked stakeholder the public can look to for reliable and objective risk assessment of unconventional oil and gas development is the insurance industry. The insurance industry depends on scientific information about unconventional oil and gas development in order to understand, evaluate, and price the risks accurately. But the insurance perspective is rarely

a part of the public conversation, even though the public has a vested interest in knowing whether oil and gas companies have adequate liability insurance and whether home owners’ policies protect against fracking-related damages.

By emphasizing the importance of factual information and putting a price on the risks, insurance provides a concrete framework to discuss concerns outside the often politically and ideologically charged debate between pro- and anti-fracking interests. In all cases, industry reports show that insurers are looking carefully at the most up-to-date scientific informa-

Stakeholders on both sides may skip over nuances, uncertainties, limitations, and caveats of scientific studies or quote sections out of context as evidence to support claims that the research may not.

tion when anticipating potential damages and making cost determinations. They look at many of the same issues that are of concern to communities: risks to water supplies, risks to surrounding land use, chemical exposure, and earthquakes.

Community Right to Know

The public has a right to know about the impacts—positive and negative—that unconventional oil and gas development may have. Citizens have a right to understand the uncertainties and limitations of our scientific knowledge. They have a right to know what is, can, or should be covered by regulations. And they have a right to be engaged in the discussion. Ultimately, citizens need to be empowered with the information needed to make informed decisions about unconventional oil and gas development in their communities.

Union of Concerned Scientists

The fully referenced report is available on the UCS website at www.ucsusa.org/HFreport.

The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet’s most pressing problems. Joining with citizens across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.

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