



## **Testimony of Elgie Holstein**

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Hearing of the House Committee on Science, Space and Technology Regarding  
Unconventional Oil and Natural Gas Development and the Role of Federal, State, and  
Local Authorities

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Chairman Smith, Ranking Member Johnson, and other Members of the Committee, thank you for this opportunity to discuss some of the challenges and opportunities associated with the rapid growth in unconventional oil and natural gas production.

Environmental Defense Fund (EDF) is a national environmental advocacy organization with more than one million members and supporters nationwide. We are dedicated to finding innovative approaches to solving some of the most difficult national and international environmental challenges. Whenever possible, we collaborate with private-sector partners, state and federal leaders, and other environmental organizations interested in maximizing incentives for market-based solutions to environmental problems.

EDF has assumed a leadership role in collaborating with scientists, state regulators, academic institutions, the private sector, and other environmental organizations to better understand some of the key issues surrounding the debate over hydraulic fracturing and other aspects of oil and gas development. At the same time, we continue to make the point that even with the recent increases in recoverable oil and gas reserves, the U.S. must commit itself to a cleaner and more sustainable energy future.

My testimony discusses a number of real and substantial risks to public health and the environment associated with the rapid expansion of hydraulic fracturing in the U.S. and the role of government in exercising its traditional role in minimizing those risks. Absent such action, the result will be increased global warming pollution, harm to communities where gas development is taking place, and heightened public opposition to the continued expansion of natural gas production and use.

The good news is that solutions are available, the costs of preventive and remedial action are low, and new technology to address those risks at even lower cost is increasingly available.

The question before this Committee is whether it is appropriate for state and local governments to apply their longstanding, traditional authorities to ensure that their citizens are reasonably protected from economic and, environmental harm. We believe that the answer is “yes.”

While EDF has not been engaged directly in the various debates over state and local hydraulic fracturing bans and other restrictions, we believe that the issues around which those debates revolve are legitimate and do reflect scientifically supported concerns.

We also believe that addressing those issues is vital to establishing the public trust and confidence that the industry will need if hydraulic fracturing is to be applied as broadly as they anticipate.

Some gas enthusiasts downplay environmental concerns, and characterize those citizens who raise them as alarmist. But they are wrong to do so. An estimated 15 million Americans live within one mile of an oil and gas well drilled since 2000 and are impacted by development on a regular basis.

For champions of natural gas, the signs of public concern are ominous. In a 2013 national poll, the Pew Research Center found that 49% of those surveyed opposed the increased use of hydraulic fracturing. Earlier this year, a Gallup poll found that 60% of Americans surveyed are either opposed to, or undecided about it.

### **Natural Gas Opportunities and Challenges**

There is no question that unconventional gas development is lowering energy costs, creating new jobs, supporting more domestic manufacturing, and even delivering some measurable environmental benefits. For example, relative to coal, gas-fired electricity generation produces about half the carbon pollution, no sulfur dioxide or mercury emissions, and a small fraction of the fine particulate pollution common with the combustion of coal.

But as anyone who has lived next to or visited a well site can attest, unconventional natural gas development is a heavy industrial activity, imposing significant public health and environmental risks on the communities where production takes place. Those communities are understandably concerned about the potential impacts of oil and gas development on their infrastructure, their air and water, and of course their social fabric.

While many policy-makers in Washington celebrate the new abundance of natural gas, it is both predictable and understandable that states, cities, and towns are insisting on exercising their traditional role in protecting their communities through reasonable restrictions on oil and gas development, including hydraulic fracturing, within their

borders. Such responses are entirely consistent with state and community application of zoning, right-to-know laws, industrial safety standards, etc.

Achieving a true balance of interests is critical. That means ensuring that gas is developed responsibly through strong public health, safety, and environmental protections. Striking the right balance also means continuing to invest in the deployment of energy efficiency and renewables, even as our nation rushes to develop our new natural gas resources.

As the role of natural gas in our nation's energy mix continues to grow, it is important to get the rules right. As mentioned above, doing so will not only help minimize adverse environmental impacts, it is an essential ingredient in building public trust and confidence in the ability and commitment of the industry to reduce the impacts of hydraulic fracturing on communities.

Later in my testimony, I will describe in more detail examples of some state and local measures designed to protect the economy and environment of local communities.

First, however, I'd like to elaborate on several of the key issues presented by hydraulic fracturing.

### **Issues in Oil and Gas Development Including Hydraulic Fracturing**

*Well Integrity* -- While there has yet to be conclusive evidence that hydraulic fracturing itself has caused drinking water contamination through the fractures themselves, it is well understood by industry and oil and gas regulators alike that poor well construction and maintenance can create pathways for contamination of groundwater resources by introduced and naturally occurring chemicals.

*Water Management* -- Between one and five million gallons of fracking fluids are typically used in a hydraulic fracturing operation, and around 800 billion gallons of wastewater are generated annually by onshore oil and gas operations annually in the United States. Where that water comes from (think about drought-plagued Texas) and how it is managed during storage, transportation, treatment, and disposal are issues of legitimate state and local concern, as spills of chemicals or wastewater at the well site, or in transit, can pollute streams and groundwater.

*Air Quality* -- Because of intensive shale-gas development, the small town of Pinedale, Wyoming has experienced smog concentrations comparable to those of Los Angeles. And production activities in close proximity to homes, churches, and schools have turned once-quiet rural and suburban communities in Pennsylvania, Texas, Colorado, and elsewhere into industrial zones rife with noise, dust, and truck traffic.

*Chemical disclosure* – As hydraulic fracturing has become a mainstay of unconventional oil and gas development in the U.S., public demand has grown for more information about the chemicals used in the process. While many companies at first strongly resisted mandatory disclosure, today, industry generally has come to support more transparent policies.

In addition, a state-led database of fracking chemicals, FracFocus, has become increasingly useful to the public and to all levels of government. Today, it shows real potential for becoming a reliable, and more user-friendly source of information about the chemicals finding their way into communities across the country. FracFocus recently announced major updates to the system designed to improve data quality, and will be offering raw data downloads to the public starting in May.

*Induced Seismicity* -- Reports of earthquakes occurring as a consequence of hydraulic fracturing are now widespread, including in Oklahoma, Arkansas, Texas, Ohio and Kansas. Whether as a result of high-pressure “frac jobs” or (much more commonly) high-volume wastewater disposal wells, earthquake activity in shale regions can be deeply alarming to members of the public.

Just this week, The Oklahoma Geological Survey released a statement concluding that it is “very likely” that most of the recent earthquakes – and there have been hundreds -- in the central part of the state were “triggered by the injection of produced water in disposal wells.”

Accordingly, numerous states have rushed to implement new monitoring and reporting requirements for fluid disposal wells. At least one state, Ohio, has implemented new monitoring, reporting, and control requirements related to hydraulic fracturing and seismicity.

Arkansas has banned disposal wells in a large area deemed vulnerable to induced seismicity.

Oklahoma now requires a halt to water injection below certain geologic intervals.

Kansas has cut in half permissible fluid injection volumes in certain geologically sensitive areas.

*Infrastructure* – The impact on roads, water systems, schools, social services, land and neighborhoods of intensive oil and gas development is a leading concern of the many communities across America that find themselves – often for the first time – in the center of new energy development.

Traditionally, in states like Texas and Oklahoma, hundreds of cities adopted local rules that enabled the orderly development of oil and gas while at the same time protecting

lives and property from the most hazardous aspects of drilling activity. Other communities, including many newer to oil and gas development, have sought to follow their example. Unfortunately, such measures are under attack in many jurisdictions, including, most recently in Texas where the legislature is considering a bill that would sweep away nearly all local authority.

Dismantling local regulatory authority risks creating regulatory gaps. It also deprives communities from imposing even the most reasonable rules governing issues such as well-site set-backs from homes, schools, churches and parks. The result can be even more determined citizen opposition to oil and gas development.

### **The Methane Problem: A National Issue**

An area of particular environmental concern to scientists and environmental groups is the problem of methane emissions from natural gas operations. Although it burns more cleanly than coal, un-combusted natural gas is mostly methane, a greenhouse gas 84 times more potent than carbon dioxide in the first 20 years after its release. Decisions made now about methane emissions will have a major impact on the rate at which the climate changes over the lifetimes of many Americans living now and spanning the next several generations. (For more details about the science underlying concerns about methane and other short-lived climate “forcers,” please see the attached article from Science magazine.)

As natural gas exploration and production continue to expand, methane emissions threaten to cancel out the climate benefits that natural gas proponents often claim, especially with regard to the growing share of electricity generation fueled by gas.

Across our economy, the oil and gas sector represents 37% of U.S. methane emissions, the largest of all U.S. industrial sources, according to EPA. Estimates vary widely about how much methane is being leaked or vented during the production and transportation of natural gas. EPA estimates are in the range of 1.3%, while a paper by Brandt, et. al. in the journal Science conservatively estimates it might be double that amount. For natural gas to result in net climate benefits for all uses, that rate needs to be below 1%. (Brandt, et. al. Methane Leaks from North American Natural Gas Systems, SCIENCE, Vol 343 14 February 2014)

EPA’s latest inventory, published earlier this month, estimates that in 2013, the oil and gas industry released more than 7.3 million metric tons of methane into the atmosphere from their operations – a three percent increase over 2012. That’s enough to meet the needs of 5 million households. It packs the same climate punch over the first 20 years as the CO<sub>2</sub> emissions from more than 160 coal-fired power plants.

According to EPA, the only sector of the natural gas supply chain where emissions have decreased is the production phase, but that reduction is a direct result of EPA's regulation of hydraulically fractured gas wells.

While research about methane emissions is on-going, we already know enough to know that there is much that can and should be done. A cost analysis performed by experts at ICF, International – based on data from industry -- found a striking opportunity for achieving dramatic reductions in methane emissions from the oil and gas sector. The study revealed that a *40% reduction in methane emissions from the sector could be achieved over the next five years at a cost of less than 1 penny per thousand cubic feet of gas produced*. Low-cost reductions of this magnitude would go a long way toward ensuring that the expansion of natural gas production will not be a net loss for the environment.

Moreover, according to ICF, methane emissions reductions at this scale can be achieved using *current* technology. That is, most if not all, of the equipment and operational improvements needed to provide meaningful emissions reductions can already be found in the market.

Accordingly, in any discussion about the need, means, or opportunities for reducing methane emissions from the supply chain, there need be no debate about whether the equipment exists to get the job done. It does, and it is cost-effective to use. But we need state and federal rules to ensure that best practices are adopted nationwide.

Therefore, we believe that state and federal action to require methane emissions reductions is needed now.

Current federal air emission standards for oil and gas operations apply only to a small subset of activities, and as the ICF study implies, expanded regulation could yield very large environmental benefits for a very small total cost.

With a goal of reducing methane emissions by 40-45% by 2025, the Administration's economy-wide methane strategy includes new EPA rules restricting methane emissions from new oil and gas drilling operations, the first draft of which will be released this summer.

In addition, the Bureau of Land Management (BLM) has issued a final rule governing unconventional production on federal lands. Additional measures from BLM, designed to prevent the waste of natural gas through venting and flaring, are also under consideration. BLM has an obligation to be a good steward of our federal lands, which includes taking all necessary steps to avoid waste of the public's resources.

While EDF's interest in reducing methane emissions is driven by environmental concerns, we note that every ounce of methane that is vented or leaked into the

atmosphere or flared at the well site is a loss to our economy and our national energy security. The opportunity to achieve a near-term, 40% reduction in methane emissions discussed in the ICF Report represents a potential savings of the equivalent of 54 LNG tankers worth of natural gas, every year. Surely, we all have an interest in putting an end to that kind of waste.

### **The Land, Water, and Waste Problem**

In addition to methane emissions, oil and gas development can pose considerable risks to land and water resources. Pollution of groundwater resources from subsurface operations is difficult to measure, but it is a serious concern that has been the focus of intense regulation, primarily at the state level, for over a hundred years.

A particular focus of that issue is the management of surface operations. Estimates indicate that nearly 70% of documented groundwater contamination events are due to surface water and waste management issues. Just as EDF has been a recent champion of significant work to reduce air impacts from oil and gas development, we also recognize that a dramatic reduction in the frequency and severity of both surface and subsurface releases of harmful substances and other impacts on the environment from oil and gas development is an equally important need. It is important that we provide as much focus and diligence in minimizing land and water risks as we have begun to do with methane emissions.

There are two critical paths to protecting land and water impacts. One is ensuring that well construction and integrity rules are keeping pace with leading technologies and practices, in order to protect drinking water and other resources from contamination during the construction and operation of a well. The second critical path to protecting land and water quality concerns how water and other wastes are managed at the surface. It is important that even the most general and long-utilized aspects of oil and gas operations – such as storage and transportation – along with new and novel practices like wastewater recycling and discharge, keep pace with new and improved technologies and regulations that help to manage both old and new risks at the surface.

EDF has long studied the first critical path, well integrity, and has worked with states to improve their rules on this subject, as well as with standard-setting organizations like the American Petroleum Institute. We are now looking to improve our understanding, in concert with academia and industry, of the water and wastes produced in conjunction with development in an effort to minimize risks of the second critical pathway – surface management.

The Environmental Protection Agency has not been absent from the picture on these subjects. Recently, EPA proposed pretreatment standards for publically owned treatment works (POTWs) that will prevent the discharge of pollutants in wastewater

from onshore unconventional oil and gas extraction facilities to these POTWs, reflecting current (though not historical) industry practice. The draft rule recognizes that constituents in drilling wastewater can create serious problems at POTWs. Among them are the disruption of efficient operations and the discharge into surface waterways of untreated biosolids and other pollutants. This is a positive step on the part of the EPA towards protecting surface waters from discharges of harmful compounds that water treatment facilities may not be adequately equipped to handle.

Similarly, EPA has launched a study to examine oil and gas wastewater treatment and discharge from Centralized Wastewater Treatment facilities, the industrial counterpart to POTWs. EDF will be offering our expertise and information in order to help ensure that the risks of treatment and discharge are adequately addressed.

A recent Ground Water Protection Council report on State Oil and Natural Gas Regulations Designed to Protect Water Resources indicated that a growing number of oil and gas producing states have updated or created new rules and policies to better protect water sources. Compared with a similar analysis done in 2009, the report shows a positive trend emerging among the states to tighten measures that will minimize the risks of local groundwater contamination caused by oil and gas development.

Effective environmental regulation is not, however, a “set-it-and-forget-it” exercise, particularly when it comes to surface waste and water management. The report demonstrates that many states realize the importance of continuous improvement in technology, operations, and regulatory oversight in order to ensure the clean water protections communities expect and deserve. While the momentum documented is encouraging, the fact remains that the oil and gas industry is rapidly expanding without sufficient, universal public health and environmental protections for our air, water, and communities. That’s why EDF believes that states, along with the federal government, continue to have work to do to create and expand their rulebooks and devote necessary resources to enforce those rules once developed.

## **State Actions**

When it comes to environmental regulation of oil and gas operations, states are not waiting for the federal government to act.

After several of its communities voted for bans and other limits on hydraulic fracturing, Colorado last year put in place the nation’s first and most ambitious set of rules designed to directly reduce all hydrocarbons -- methane as well as volatile organic compounds. Some of the industry’s largest operators supported the new rules because they understood their responsibility to demonstrate environmental leadership and to reassure an increasingly concerned public.



The rules require leak-detection-and-repair programs for all wells – both new and existing, conventional and unconventional. The largest well sites will be inspected monthly. Most wells will be inspected quarterly. Unnecessary venting during well maintenance will no longer be allowed. And so-called high-emitting valves will be replaced by low- or zero-emission valves. Existing storage tanks will have to meet new pollution limits as well as current federal limits applicable to new tanks. Altogether, the new rules will annually remove 100,000 tons of methane and 90,000 tons of smog-forming volatile organic compounds, equal to the emissions of all of the cars and trucks in Colorado today.

Wyoming, where air quality has been severely compromised in a portion of the state by rapidly expanding oil and gas operations, finalized new rules for the Upper Green River Basin, where production activities were contributing to ozone non-attainment as bad as in some cities. The state's new program includes quarterly leak-detection-and-repair inspections for new and modified emission sources.

Last year, Wyoming initiated another rulemaking that will apply the same requirements to existing sources as those being required of new sources. Leaders in Wyoming recognize that you don't solve the problem if you don't tackle existing sources.

In the area of water protection, Wyoming has also adopted some of the country's best requirements for groundwater testing around all new oil and gas wells: one baseline sample supplemented by two rounds of post-completion follow-up testing. The results are made public.

In Ohio, Governor Kasich supported changes to the general permit for oil and gas operations. The changes require leak-detection-and-repair program for volatile organic compounds from new, unconventional wells --like Wyoming and Colorado, requiring quarterly inspections using an infrared camera or handheld hydrocarbon analyzer. In announcing the new policy, Kasich administration officials noted that significant methane reductions will occur as a co-benefit of the rules. The Governor also supported chemical disclosure rules, which are now in place. The Ohio Department of Natural Resources is engaged in a slate of rulemakings to improve surface operations in the state, including a major rulemaking on well pad construction and an upcoming one on water treatment and recycling facilities.

In North Dakota, a state where new unconventional oil and gas development is transforming the economy, the massive amount of flaring of natural gas – which is both a waste of an important national energy resource and a significant source of air pollution in northwestern North Dakota – has attracted national attention. The state recently established enforceable rules to crack down on unconstrained flaring – even requiring operators to shut in wells if they fail to meet state gas-capture targets . In a recent rulemaking related to well integrity, North Dakota required operators to notify

offset wells prior to hydraulic fracturing in order to prevent ‘frac hits’ and other potentially negative interference to existing production wells.

In Pennsylvania, the Department of Environmental Protection is in the middle of a rulemaking to strengthen rules for waste storage, noise, surface disturbance and “area of review,” which requires operators to investigate potential flow pathways near planned wells, in order to minimize the risk of groundwater contamination. But Pennsylvania has not kept up with leading states on regulation of air emissions, but the new Governor has highlighted the need to address methane to ensure natural gas can meet its full potential as a lower-carbon alternative to coal.

Alaska also has finalized more than a dozen new well integrity and hydraulic fracturing requirements, including an “area of review” requirement similar to Pennsylvania’s, which will reduce the risk of water contamination.

Texas made major improvements to its regulatory program in 2013 and 2014. In addition to updating on-site recycling rules and introducing seismicity guidelines, Texas passed a major overhaul of its well integrity rules that, since going into effect in early 2014, have reduced blowouts by 40% and injuries from blowouts by 50%.

## **Conclusion**

The shale gas boom has the promise of delivering valuable economic and environmental benefits to the country, but at least with respect to the environment, it is a promise not fully realized.

Because in many states new regulatory measures have not kept pace with the intense rate of new oil and gas development (made possible by hydraulic fracturing), local communities have become increasingly restive about shale oil and gas development within their borders. While drilling bans may not be the solution in the long run, they are surely a reflection of the need for governments – federal, state, and local – to take more aggressive action to protect the environment and the economy.

Thank you for the opportunity to share our thoughts about the basis for public concern about the rapid expansion of oil and gas development. I look forward to taking your questions.