



Oil and gas field in Utah

National Energy Technology Laboratory

Doing It Right: *Ensuring Responsible Natural Gas Development on Our Public Lands*

Winter 2011

KEY POINTS

1. The burning of natural gas contributed more than 21 percent of the country's carbon dioxide emissions in 2008.
2. Local air quality has been severely degraded in some areas due to the extraction and processing of natural gas.
3. Natural gas development can—and does—cause long-term, cumulative impacts on lands, wildlife, and ecosystems including habitat fragmentation.
4. Hydraulic fracturing is exempt from the Safe Drinking Water Act, and companies are not required to publicly disclose the chemicals that they inject underground, sometimes close to drinking water sources.
5. Natural gas construction activities are exempt from the federal stormwater prevention program.
6. Policies and laws need to ensure that natural gas development is done responsibly and in an environmentally-safe manner.

THE CLAIM: NATURAL GAS PRODUCTION IS “CLEAN.”

The public lands of the Rocky Mountain West—Montana, Wyoming, Colorado, Utah, and New Mexico—harbor some of the most spectacular and wildlife-rich landscapes in America. These lands also harbor prodigious amounts of natural gas resources, the development of which has brought both economic activity and environmental degradation to the communities of the region. Currently about 15 percent of U.S. natural gas production derives from federal onshore lands,¹ and a rush towards more natural gas production across the country is expected as unconventional shale plays become economically developable.



Drilling in the Upper Green River Valley, Wyoming

Peter Aengst

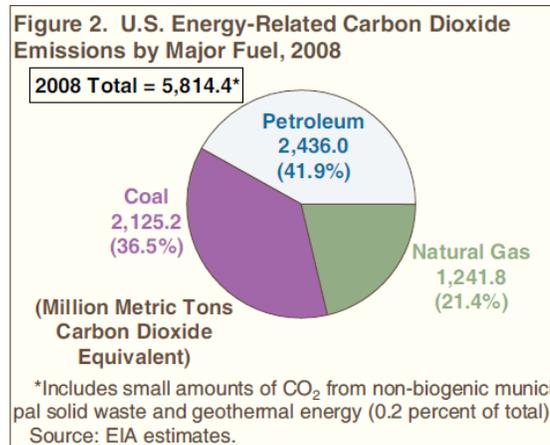
Recently, the natural gas industry has been promoting itself as a “clean bridge fuel” between the dirtiest fossil fuels like oil and coal and clean, renewable energy like solar, wind, and geothermal.

But how clean is natural gas, really? In fact, natural gas development has the potential to inflict serious environmental damage if not undertaken in a responsible, environmentally-safe manner. In other words, natural gas development must be “done right.” “Doing It Right” means:

- **Unprotected wild landscapes and sensitive cultural sites are placed off-limits to leasing and development;**
- **Crucial wildlife habitats are protected from the adverse impacts of oil and gas activities;**
- **Loopholes in federal laws protecting drinking water and surface water quality are closed, and public disclosure of chemical compounds used in drilling is required;**
- **Air quality is protected from ozone-forming emissions, fugitive methane emissions, and other air pollutants that accompany natural gas development;**
- **The rights of surface owners to protect their lands and waters in split-estate situations are honored;**
- **Sufficient agency staffing and resources for field monitoring and inspection are utilized as drilling plans are implemented; and**
- **Development on federal lands is implemented through phased leasing to minimize socioeconomic and environmental impacts.**

ISSUE #1: EMISSIONS AND AIR QUALITY.

It is true that natural gas is approximately 30-50 percent cleaner *burning* than coal.² Nevertheless, natural gas accounted for over a fifth of U.S. carbon dioxide emissions in 2008.³



Source: Energy Information Administration. "Emissions of Greenhouse Gases in the United States 2008."

Additionally, the drilling and processing of natural gas and the infrastructure itself release methane, a greenhouse gas 30 times more potent than carbon dioxide in terms of its heat-trapping ability.⁴ And according to a study by the non-partisan Congressional Research Service, methane emissions from natural gas infrastructure—pipelines, compressors, valves, storage facilities, etc.—are the third largest source of methane emissions in the country.⁵

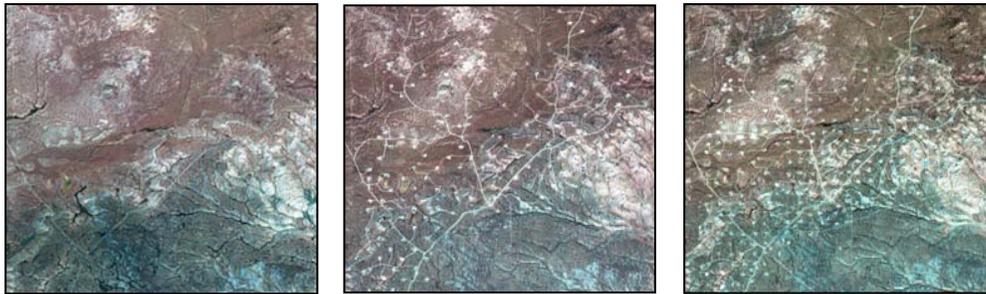
Ground level ozone (a major component of smog) concentrations in some Western communities have risen spectacularly with the advent of intense natural gas development. For example, Sublette County, Wyoming—a rural community where more than 3,100 wells were drilled between 2000-2009—went from regular background levels to levels exceeding those of Los Angeles and Houston in 2008, all as a consequence of natural gas development.⁶ In early 2008, the Wyoming Department of Environmental Quality issued several health alerts for the county after recording ozone levels significantly above federal health standards.⁷ As former Wyoming Governor Dave Freudenthal put it, "The State of Wyoming is ... challenged by the need to reduce emissions from the natural gas industry..."⁸



Energy development in Wyoming
Bureau of Land Management

ISSUE #2: LANDS AND WILDLIFE HABITAT.

Natural gas development can have devastating and long-lasting impacts on lands, with some gas fields remaining in operation for 30-50 years.⁹ Drill rigs are not the only infrastructure needed for drilling and production; rather, a complex network of roads, well pads, pipelines, compressor stations, waste pits, staging areas, and other structures characterize a typical gas field. This cumulative industrial framework fragments lands and habitats, especially when well pads are closely spaced, as seen in the sequence of photos below:



Jonah Field, Wyoming in 1986 (pre-drilling), 1999 (one year of drilling and 80-acre spacing), and 2002 (4 years of drilling and 40-acre spacing)

John Amos, Skytruth

Wildlife research has demonstrated the consequences that intense and rushed natural gas development can have on ecosystems.¹⁰ Habitat fragmentation from oil and gas development affects the feeding, courtship, migration, and other wildlife behaviors, as their patterns of habitat use across the landscape are disrupted.¹¹ It also negatively impacts the overall health of ecosystems, assisting the spread of invasive species and diseases, causing sediment to wash into streams, changing the makeup of local vegetation, and further damaging the landscape.¹² Landscape analysis methods are available to evaluate the ecological impacts of oil and gas infrastructure that extend across the landscape well beyond the physical structures of the oil or gas field.¹³

"Colorado Division of Wildlife officials have seen both indirect effects leading to population declines and direct mortality in wildlife, in areas of intensive natural gas drilling... [a] senior terrestrial biologist said that if and when intensive drilling comes to the... area where several gas leases have been sold, the impacts will be unmistakable." - The Valley Journal (Carbondale, Colorado), 12/4/2008.

Many places where intensive gas drilling takes place are also home to vital keystone species. The Greater Sage-grouse, an important game bird that inhabits the sagebrush steppe habitat of the Rocky Mountain West, is a prime example of the negative consequences to iconic species that arise from natural gas drilling. One government report details the specific impacts and ongoing decline of sage-grouse from oil and gas development.¹⁴ The species has disappeared from nearly half of its historic range due to habitat fragmentation and other disturbances, and the Department of the Interior last year listed the species as a prime candidate for protection under the Endangered Species Act.¹⁵ Oil and gas development is cited by the U.S. Fish and Wildlife Service as a primary threat to sage-grouse populations in the Rocky Mountain West.¹⁶ However, sage-grouse is just one example of the many species dependent on sagebrush steppe habitat that are threatened by oil and gas development.



Greater Sage-grouse
Idaho Fish and Game

ISSUE #3: WATER RESOURCES AT RISK.

Natural gas extraction, particularly when carried out with hydraulic fracturing, has major impacts on water resources, in terms of the amount of water used, chemicals added, and wastewater that both remains underground and returns to the surface. Hydraulic fracturing is a drilling process that uses millions of gallons of water combined with sand and tens of thousands of gallons of chemicals for each well drilled to create underground fractures that allow natural gas to be removed. The technique is used in over 90 percent of wells across the country,¹⁷ most frequently in geologic formations like shale plays, tight sands, and coalbeds.



Fish killed in spill in Pennsylvania
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According to the Susquehanna River Basin Commission, 4-7 million gallons of water are typically used in every production well using hydraulic fracturing in the eastern United States' Marcellus Shale.¹⁸ Continued withdrawals of this size can have cumulative effects on fish and aquatic species, especially during drought or low water conditions, and cause impediments for other uses of water resources like agriculture, public water supplies for cities and towns, recreational fishing, and cooling of power plants.¹⁹ Large amounts of water also increase the risk for spills, contamination, and runoff from pads to adjacent rivers and streams.

In addition, hydraulic fracturing is one of only two underground injection control processes that are not regulated under the federal Safe Drinking Water Act. This exemption was granted by Congress in 2005, at the behest of the oil and gas industry. Unfortunately, natural gas companies and their service operators also are not required to publicly disclose the chemical compounds that they inject underground, many of which are harmful to health and some of which are known carcinogens.²⁰ Complaints of well and drinking water contamination after hydraulic fracturing has occurred are surfacing around the country.²¹



Polluted water in Pennsylvania
Darrell Smitsky

Finally, after natural gas is extracted from a well, about 15 percent of the thousands of gallons of water used to fracture return to the surface.²² This flowback is made up of water, the chemicals in the fracturing fluids, and other naturally-occurring yet potentially harmful metals and chemicals. The disposal of this wastewater has become a serious issue for communities facing natural gas drilling, as municipal water treatment facilities may not have the technology nor the capacity to treat such high volumes of extremely polluted water.²³

ISSUE #4: UNSTABLE LOCAL ECONOMIES.

Oil and gas development often results in economically unstable communities due its boom and bust nature.²⁴ Some of this instability is due to the tendency for the industry to engage in rapid development over a large scale which has myriad impacts on community economic and social indicators. For example, the high wages paid by the natural gas companies during booms make it difficult for established small non-energy businesses and local governments to find workers.²⁵ Social problems develop from a sudden influx of workers migrating into the area during “boom” times.²⁶ Drilling booms force local governments to spend more to provide basic services for a rapidly growing population.²⁷ Oil and gas drilling also results in increased per capita emergency service demands, which also increases the need for public funded services.²⁸ All of these problems are exacerbated by the rapid pace and widespread scale of natural gas drilling.²⁹ Careful planning and “phased development” can help mitigate both the social disruption that accompanies the “boom town” atmosphere of rapid development, and help manage the environmental impacts of such development.



Workers on a natural gas rig
National Energy Technology Laboratory

DOING IT RIGHT.

If not carried out in an environmentally safe and measured manner, natural gas development can cause significant risks to air, wildlife, and water. However, there are a number of common sense policies that Congress and the Obama Administration (as well as state and local governments) can undertake to make sure new natural gas developments protect our natural environment and human communities.

1) Place unprotected wild landscapes and sensitive cultural sites off-limits to leasing and development.

Places with significant natural values like sensitive species, wilderness qualities, recreation potential, and cultural sites should not be leased for natural gas development.

2) Protect crucial wildlife habitats from the adverse impacts of oil and gas activities.

Federal and state agencies must carry out rigorous scientific analyses *before* leasing even takes place, including spatial analyses to estimate habitat fragmentation. “Best Management Practices” such as seasonal restrictions and phased, concentrated development should be implemented that ensure that the highest standards of wildlife protection are followed. Core habitats for threatened or endangered species must be considered “no-go zones” for energy development, and Bureau of Land Management and National Forest land use plans should identify and screen out sensitive areas from leasing.

3) Close loopholes in federal laws protecting drinking water and surface water quality, and require public disclosure of chemical compounds used in drilling.

Congress should close loopholes in the Safe Drinking Water and Clean Water Acts that place drinking water and surface water quality at risk from natural gas development, require full disclosure of the chemical compounds used in the extraction of natural gas, and federal land management agencies should require public disclosure of the chemical compounds used to extract gas from federal leases.

4) Protect air quality from ozone-forming emissions, fugitive methane emissions, and other air pollutants that accompany natural gas development.

Congress should remove exemptions from the Clean Air Act regarding air pollutants and natural gas production, specifically those provisions that ensure that emissions from gas infrastructure are properly aggregated. Additionally, federal agencies that authorize large concentrated drilling projects on public lands have an affirmative responsibility to assure protection of air resources.

5) Honor the rights of surface owners to protect their lands and waters in split-estate situations.

Surface owners must be able to determine where drilling facilities are located, the time of day that drilling activities take place, be informed of the chemicals being used on and below their property, and given financial guarantees that their property will be reclaimed.

6) Sufficient agency staffing and resources for field monitoring and inspection are utilized as drilling plans are implemented.

The BLM needs sufficient on-the-ground resources to assure that development and permit terms are complied with.

7) Development on federal lands is implemented through phased leasing and drilling to minimize socioeconomic and environmental impacts.

This involves incrementally opening an area for development, limiting the total area developed and/or limiting the percent of the area disturbed at any one time in order to reduce the adverse impacts to other natural resource values.

By implementing these and other policy reforms, natural gas development can be “done right” in America. As we work toward a sustainable energy future that appropriately emphasizes renewable energy sources and increased energy efficiency, it is critical that the health and safety of people and environments are protected from the adverse impacts that accompany natural gas development.

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ABOUT THE WILDERNESS SOCIETY

Since 1935, The Wilderness Society has led the conservation movement in wilderness protection, writing and passing the landmark Wilderness Act and winning lasting protection for 109 million acres of Wilderness, including 56 million acres of spectacular lands in Alaska, eight million acres of fragile desert lands in California and millions more throughout the nation. It is our calling and our passion to protect America's wilderness, not as a relic of our nation's past, but as a thriving ecological community that is central to life itself. To meet our goals, we use science and collaboration with communities and conservation groups to bring about sensible policies and positive change in land conservation. Above all, we work to achieve our mission: *to protect wilderness and inspire Americans to care for our wild places.*

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² United States Environmental Protection Agency. "Natural Gas." Updated December 28, 2007. <http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html>

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