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Three Key Environmental Risks of Natural Gas Development

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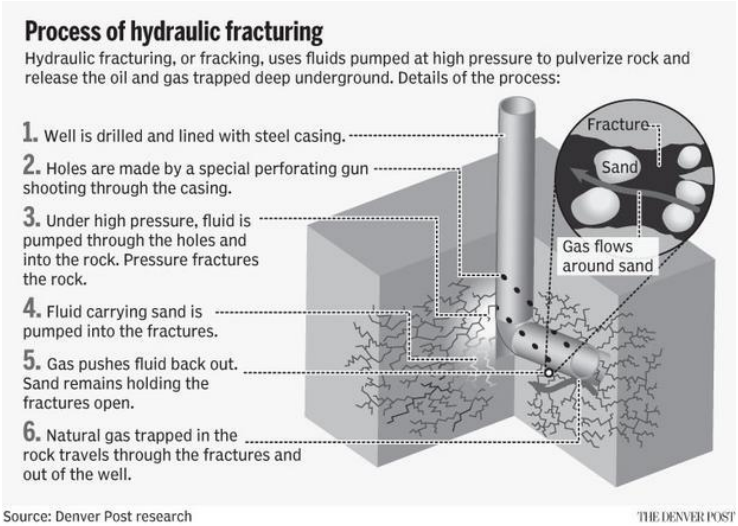
Natural gas is a resurgent part of the energy mix due to dramatic advancements in technology allowing access to onshore resources that were previously too difficult or expensive to reach. Increasing development, however, is coming under intense scrutiny due to the potential health hazards and environmental risks that must be mitigated if natural gas is to fulfill its promise as an attractive transition fuel on the path to a renewables-based economy.

Most of the controversy regarding shale gas development has centered on the technique of hydraulic fracturing, or "fracking." The Environmental Defense Fund (EDF) believes that there are circumstances in which hydraulic fracturing could cause water pollution. However, there are at least three other aspects of gas development that present greater health hazards and/or environmental risks. First, poor well construction may actually be the root cause of many of the well contamination and other incidents that have often been attributed to fracking. Second, methane leaks during production and other air emissions threaten public health and may offset much of the climate benefit of using natural gas. Furthermore, poor handling of contaminated water produced from natural gas wells threatens to pollute surface and groundwater.



What Are the Problems?

Hydraulic Fracturing vs. Well Construction

Shale natural gas production has been linked to numerous incidents of water and surface contamination, as well as to at least one home explosion. While the media often blames hydraulic fracturing exclusively, studies indicate that problems may actually stem from a more fundamental issue of well construction and design.

The controversial technique known as hydraulic fracturing involves using high pressure fluids to create cracks in the shale formation allowing operators to increase the flow of natural gas. Since the hydraulic fracturing fluid may include toxic chemicals, the technique has generated significant controversy even though the percentage of chemicals used in fracturing fluid is small. A top EDF priority is the adoption of stringent rules requiring disclosure of the contents of hydraulic fracturing fluids. EDF is also promoting the development and use of less toxic substitutes for the most harmful chemical additives.

There have been all too many accidents associated with the development of natural gas. A Riverkeeper report, *Fractured Communities*, details numerous examples including, but not

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limited to, a home explosion in Bainbridge, OH; water well contaminations in Dimock, PA; and discharge of toxic chemicals into surface water in Bradford County, PA.

It is important to keep in mind that the direct causes of the vast majority of water pollution incidents tend to be surface spills, high pressure at the top of the well (caused by poor well construction that allows shallow gas or other substances to leak from the wellbore near the surface into drinking water aquifers), or poor handling of the produced water that flows back out of the well following completion ("flowback").

EDF is working closely with other environmental advocates, states, industry, and the EPA to significantly reduce the risk of contamination associated with shale gas drilling by creating a model regulatory and compliance architecture for proper well construction. If adopted and enforced, EDF anticipates this framework will significantly reduce the frequency of groundwater contamination.

Air Quality

Aside from climate impacts, it is important to note that compared to coal plants, natural gas power plants offer other distinct air quality benefits – emitting dramatically less smog-forming nitrogen oxides, almost no sulfur dioxide, and no mercury per unit of electricity produced. That said, air emissions resulting from the production, storage, processing, and transportation of natural gas can threaten public health. Emissions, including volatile organic compounds (VOC), nitrogen oxides (NOx), and greenhouse gases (GHG), are either combustion by-products from engines and heaters or occur from leaks and routine venting at well sites, processing plants, or from the pipeline network.

These emissions contribute to pollution associated with serious human health effects and adverse environmental consequences including toxic air pollution, ground-level ozone or "smog", particulate pollution, climate-disrupting pollution, and the haze that obscures scenic vistas in national parks and wilderness areas. For example methane, the primary component of natural gas, is itself a greenhouse gas that is typically considered to be 25 times more potent than carbon dioxide. Current leakage rates of this GHG throughout the natural gas life-cycle are unacceptably high. There is much uncertainty about the amount of leakage, but leakage rates of 4 to 6 percent might be enough to reach the 'break-even point' at which natural gas is no better on a carbon basis than coal as a source of electricity.

EDF's main focus at present is reducing the emissions from leaks and venting. Reduction approaches include repairing worn equipment, using "green" well completion techniques, and eliminating venting to the atmosphere, among others. In addition to the environmental benefits, these can frequently be cost effective strategies as the captured natural gas can be sold.

Wastewater Disposal

Water that flows to the surface after hydraulic fracturing usually contains various toxins that were present in the target formation as well as chemicals used in the hydraulic fracturing process. Surface spills and/or inadequate disposal of this waste can cause contamination of surface or groundwater. Industry and regulators must assure that mistakes are not made in the storage, transportation, and disposal of wastes. Moreover, if surface discharges are to be permitted, it is critical that permits cover all chemicals of concern and that discharge limits be low enough to truly protect public health.

Accordingly, EDF is pressing for measures to reduce spills, improve the use and handling of chemicals, and assure proper disposal (or recycling) of flowback water.