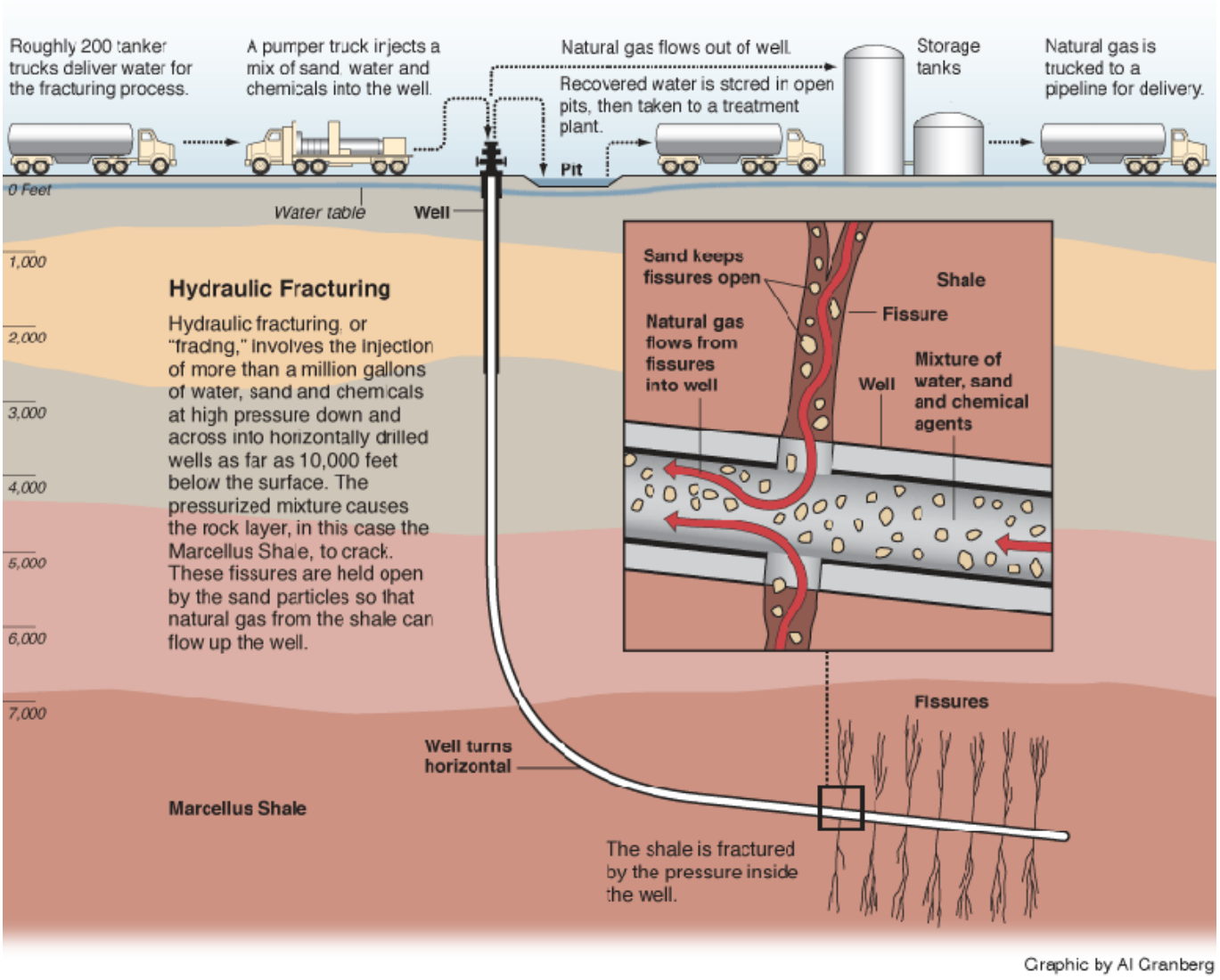
Hydrofracking: The Opportunities & Risks of Drilling for Shale Gas – a Factsheet from Energy Vision

What is "hydrofracking"?

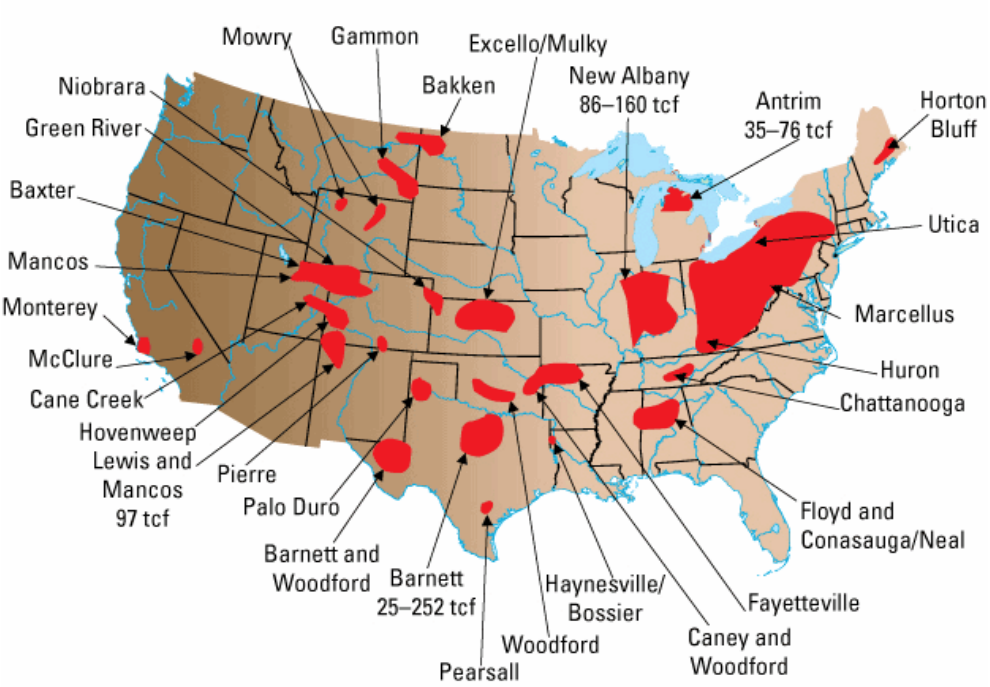
High-volume hydraulic fracturing, or "Hydrofracking," is a method of extracting natural gas from shale rock formations buried up to 10,000 feet under 30 or more states. It involves blasting these formations horizontally with water, sand and chemicals and creating fissures so the gas is released.



Graphic by Al Granberg

Where are these shale formations, and how much natural gas do they contain?

The map below shows the distribution of the major natural gas-rich shale formations identified to date in the U.S.



The natural gas contained in these shale formations represents a huge storehouse of this country's cleanest fossil fuel. The Potential Gas Committee, a non-profit group of natural gas experts, forecasts that this resource base contains 1,836 Tcf of gas. This, plus the proven reserves (238 Tcf) identified by the US Department of Energy in 2007, mean that the US has enough natural gas to last at current rates of use for 118 years.

Shale gas extraction began in the early l990s when the technology for fracturing the deeply buried shale rock formations was refined and the rising price of fuels made this technology economically viable.

In the last 15 years, a frenzy of drilling has taken place in the Western states – involving tens of thousands of individual wells (for example, 30,000 in the

State of Colorado alone). Millions of acres of land have been leased in 32 states by companies that are eager to get in on the "gas bonanza."

How does hydrofracking impact the environment?

"Hydrofracking" fluid, which is injected into shale formations, uses about one to two million gallons of water for a single "fracking," and a well may be fracked multiple times. So water resource depletion may be a concern as drilling expands, especially in parts of the water-short West.

In addition, more than 200 chemicals may be used in the hydrofracking fluid. While these make up just a fraction of the total materials in the fluid, they include recognized carcinogens (benzene, arsenic and polycyclic aromatics). Other substances are associated with endocrine disruption, damage to reproductive health, immune suppression, and genetic mutations.

Anecdotal information has been released on areas in which toxic substance-containing fluids may have escaped and contaminated watersheds. This would, indeed, pose a continuing health threat to humans and to wildlife drinking or exposed to this water. And given the rapidly expanding use of hydrofracking, more substantial documentation of water contamination is critical.

About 60% of the hydrofracking fluid is usually recovered after drilling. It is stored on site in evaporation pits and may then be trucked offsite for use in another fracking operation or for treatment and disposal in surface waters or underground reservoirs. Forty percent or more of the fluid remains underground.

Are water pollution and depletion the main issues?

Yes, but there are more. Air pollution is an issue related to site operations, evaporation pits, and to the emissions of the hundreds of heavy duty diesel trucks coming and going carrying materials, water and wastes. Large areas of cleared land and many miles of roadways scar the landscape, and water seeping into the ground is not purified as it would be if it passed through vegetated areas. Drilling operations also involve lights 24 hours a day. Noise pollution is another issue – from the initial month of drilling the well to the continuous noise generated by operation of compressor stations.

Is the water and air pollution affecting public health?

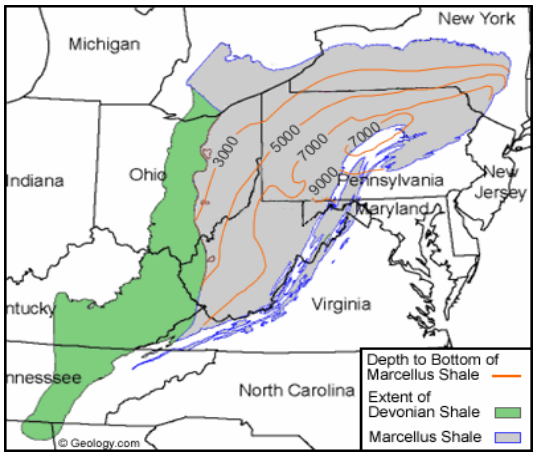
Yes. From areas in the West and in Pennsylvania where hydrofracking operations are going on have come dozens of reports of water contamination and on health impacts on citizens.

What is known is that chemicals that could impact public health are used in hydrofracking fluid. Research by Dr. Theo Colborn, a leading expert on endocrine-disrupting chemicals[1], and testimony by the Natural Resources Defense Council, by Environmental Advocates of New York, and by Riverkeeper contain discussion of these chemicals. But more thorough government documentation is needed of the quantities of these chemicals used and on related impacts on public health.

Why has there been such vehement opposition to hydrofracking in the Marcellus Shale in NYS?

The Marcellus Shale is one of the largest shale gas formations in the US. It is estimated to contain between 168 and 516 trillion cubic feet of natural gas within its entire formation.[15] It runs under much of New York State, Pennsylvania and all the way down to Tennessee.

With so much water and so many toxic chemicals used in hydrofracking, many NYC leaders and environmentalists fear contamination of the watershed that supplies pure unfiltered drinking water to more than 9 million residents of NYC and neighboring counties –half the population of NY State.



Concern extends elsewhere in the State. For example, local and environmental groups in the Finger Lakes region, the Susquehanna watershed, and other regions of the Southern Tier and Western New York, have voiced opposition to hydrofracking and to having fracking wastes containing radioactive materials disposed of in local landfills.

But, after the DEC hearings, the Commissioner did not call for a ban on hydrofracking near or in watersheds but announced that it is drafting a new general Environmental Impact Statement that will be used in evaluating new hydrofracking applications in the State. This EIS, however, will not cover applications in the NYC watershed. For these, another EIS will be prepared. Until they are complete, the DEC will not process any applications.

Even as the DEC considers the permitting process, a number of major environmental organizations, including the Natural Resources Defense Council, Environmental Advocates of New York, Earth Justice, Riverkeeper, and Catskill Mountainkeeper, are weighing steps that they may take to ensure protection of New York State's watersheds.

Is the federal government regulating hydrofracking?

Not effectively at present. This is because in 2005, when the energy act was passed, it contained what has been called the "Halliburton Loophole." With this loophole, the 2005 energy act allowed hydrofracking fluid content to be classified as a trade secret[12]. (So while the Pennsylvania

State Government has been able to obtain and post a general list of chemicals used in hydrofracking fluid, the amounts of the chemicals used has not been made available.) Hydrofracking practices were also exempted from regulation under the US Safe Drinking Water Act and other statutes.

However, the US Environmental Protection Agency, in response to growing public and Congressional concern, launched a study in March 2010 of the impacts of hydrofracking which could lead to regulation. The limitations of this study have to do with the funding provided to the agency for this work (less than $2 million while the EPA Administrator has indicated that as much as $30 million may be needed) and the fact that the scope of work does not cover public health.

Even before this, in November of 2009, a piece of legislation was introduced into the Senate and House called the "Fracturing Responsibility and Awareness of Chemicals Act," or "FRACK Act." This would give EPA back the authority to regulate hydrofracking under the provisions of the Safe Drinking Water Act. It would also require companies conducting hydrofracking operations to publish a detailed list of the chemicals in their fracturing fluid.

Would EPA regulation solve the problems?

Not totally! Regulations, while important, may take years to draft and implement and then be tied up in court. Addressing the hydrofracking issues thoroughly requires that the industry using hydrofracking technology bend its maximum effort to find solutions. The goal would be for companies to bring their product to market while eliminating the risks of water depletion, of water and air pollution and related health impacts, and minimizing the disruption of landscapes and vegetation that these operations now cause. Industry's know-how could go far in addressing many questions including:

- How to modify fracking fluid to minimize the use of toxic chemicals.
- How to tighten operations so that spills of hydrofracking fluid or fluids coming from the shale formations and leaks from pipes underground are eliminated.

- How to minimize the escape of methane or toxic fumes from operations, to prevent gas releases from evaporation pits, and maximally reduce emissions from diesel trucks and other vehicles.
- How to keep land and vegetation resources intact for wildlife and humans.
- How to safely dispose of wastewater, radioactive tailings, and other waste products associated with hydrofracking so that their contaminants do not enter the environment.

As issues and solutions are studied – some good news

While many issues need to be studied and resolved related to hydrofracking technology, the fact remains that natural gas is this country's cleanest and most plentiful fuel – the only one that can make a dent in this country's heavy reliance on foreign oil. Since the benefits related to use of natural gas in transportation are so numerous, resolving where and how it will be safe to use hydrofracking technology must be a high national priority.

As much as 70% of oil consumed in the US is used primarily to power this country's 260,000,000 vehicles. The 10 million diesel buses and trucks that operate in cities and communities coast to coast and that long haul about 70% of this country's GDP could end their addiction to oil at present by a shift to the fully commercial option – use of natural gas fuel. While buses and trucks make up just 4% of all vehicles, they consume 23% of all on-road fuel. They generate 26% of transportation greenhouse gases, and they are the major air polluters in most urban centers. So moving beyond diesel fuel for this transportation sector addresses many of this country's high environmental priorities.

Therefore, it is important to note that at present, even as boundaries and practices of hydrofracking are being studied, without expanding hydrofracking and with using just a fraction of the already developed US natural gas supplies, every urban bus and truck fleet in the country could make the shift from diesel to natural gas fuel, eliminating their reliance on foreign oil, significantly cleaning up the air for their residents, and cutting down greenhouse gas emissions as well.

Federal tax incentives have enabled more than 85 US cities to make this shift to date, taking 15,000+ polluting diesel transit buses and refuse trucks off their streets.

Perhaps most important, the shift to natural gas also positions those fleets to make a subsequent shift to an even better gas fuel -- the renewable form of natural gas, called "biomethane." This fuel is made by collecting and treating the methane gases created in places where organic wastes are breaking down: in landfills, sewage treatment plants, agricultural waste piles etc. So producing biomethane requires no drilling.

Biomethane is in expanding use today in Sweden, Germany, France, Switzerland and Spain. But it is just arriving in the US. Biomethane production facilities aimed at fueling fleet vehicles are in operation in Franklin Cy. Ohio, at the Altamont, CA landfill owned by Waste Management, and at the Dallas, TX landfill, owned by the California-based company, Clean Energy.

Industry's entrepreneurial energies focused on producing biomethane that can replace traditional "fossil gas" could both reduce the need for drilling and turn this country's garbage and sewage disposal problems into a clean fuels solution with economic benefits for municipalities dealing with their spiraling waste costs.

Research for this paper was conducted by EV intern, Caroline Herman, a Freshman at Bryn Mawr College, Bryn Mawr, PA.

Sources

1. TEDX: The Endocrine Disruption Exchange. 2010. Accessed May 20, 2010. http://www.endocrinedisruption.com/chemicals.introduction.php
2. ShaleShock. Drilling 101. 2010. Accessed March11, 2010. http://shaleshock.org/resources/drilling-101/

2a. The New York Times. The Halliburton Loophole. Published November 2009.

3. Thomas, Library of Congress. HR 2766. Accessed March 11, 2010. http://thomas.loc.gov/cgi-bin/query/z?c111:H.R.2766:
4. GovTrack. Fracturing Responsibility and Awareness of Chemicals Act. June 2009. Accessed March 11, 2010. http://www.govtrack.us/congress/bill.xpd?bill=s111-1215

5. Pennsylvania Department of Environmental Protection. Marcellus Shale. January 2010. Accessed March 11, 2010. http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77964/0100-FS-DEP4217.pdf
6. Environmental Protection Agency: Office of Ground Water & Drinking Water. Safe Water Drinking Act. Accessed March 11, 2010. http://www.epa.gov/safewater/sdwa/
7. Environmental Protection Agency of New York City. Statement on Hydrofracking. Accessed March 10, 2010.
8. EnCana Oil Company. Drilling For Natural Gas. Accessed March 10, 2010. Encana.com/operations/gas
9. Chesapeake Energy Corporation. Fact Sheet. Accessed March 10, 2010. http://www.chk.com/Media/CorpMediaKits/Regulatory_Framework_Fact_Sheet.pdf
10. River Reporter. Growing Concern About Gas Well Deals. January 2007. Accessed March 11, 2010. http://www.riverreporter.com/issues/08-01-17/head2-gas.html
11. Energy In Depth. Hydrofracking. Accessed March 9, 2010. http://www.energyindepth.org/?s=hydrofracking&x=0&y=0
12. Earth Works. Hydraulic Fracturing 101. Accessed March 12, 2010. http://www.earthworksaction.org/FracingDetails.cfm
13. Scientific American Online. Natural Gas Drilling Produces Radioactive Wastewater. November 9, 2010. Accessed March 11, 2010. http://www.scientificamerican.com/article.cfm?id=marcellus-shale-natural-gas-drilling-radioactive-wastewater
14. ProPublica. Gas Drilling. Accessed March 9, 2010. http://www.propublica.org/series/buried-secrets-gas-drillings-environmental-threat
15. New York State Department of Environmental Conservation. Marcellus Shale. Accessed March 9, 2010. http://www.dec.ny.gov/energy/46288.html
16. Riverkeeper. Drilling Reporter Volume 6. Published 2010.
17. Economic Impacts: Marcellus Shale Gas Play. 2009. Accessed March 10, 2010.
18. The New York Times. Dark Side of a Natural Gas Boom. 2009. Accessed March 9, 2010.
19. Natural Resources Defense Council. Issues: Water. Accessed March 12, 2010. http://www.nrdc.org/water/default.asp
19. Natural Resources Defense Council. Issues: Water. Accessed March 12, 2010. http://www.nrdc.org/water/default.asp

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