

Fracking – Friend of Foe?



A Brief History of Fracking

Hydraulic fracturing, otherwise known as **fracking**, is a poorly understood method of obtaining oil and gas. Many see it as the oil industry's decision to sacrifice our planet for the almighty dollar no matter the consequences while others see it as the only answer to our ever-increasing energy demand. They say fracking causes earthquakes, destroys the land and poisons the drinking water. Unfortunately, when you ask people whether fracking is good or bad, it's difficult to get an unbiased answer. If you ask the environmentalists, they'll tell you everything listed above. If you ask the oil companies who frack, they'll say that it's a clean and affordable means of retrieving the oil we need to run the country. With two such polarizing views, how do we know what to believe? Well, it's true that fracking has environmental consequences but it's also true that without it, we probably wouldn't be able to meet our energy needs. Couldn't we simply use solar or wind power? Maybe, but right now these technologies aren't able to produce enough electricity. Traditional oil and gas extraction is another option but it can be extremely difficult and costly to perform and often, can't meet our needs.



Fracking Protest - Photo credit: greensefa

Fracking isn't necessarily a new process with the very first hydraulic fracking experiments taking place in 1947. However, at that time it wasn't cost-effective enough to really make an impact on the energy industry. In the 1990s, fracking technology became increasingly more efficient with horizontal drilling and so became a viable alternative that many of the large oil companies jumped on.

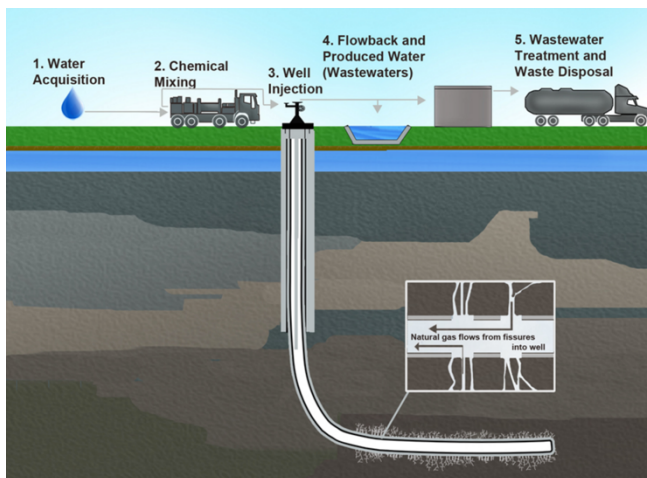
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How Does Fracking Work?

The fracking process begins by drilling a well vertically to the depth of the oil and gas reserves which are usually found 1 - 2 miles (1.6 - 3.2 km)



below the surface. Once the vertical column has been opened, the drill is turned 90 degrees and drilling continues in the horizontal direction for thousands more feet. Once the drilling is complete, a large pipe is inserted into the openings. **Slickwater (or fracking fluid)** is pumped into the pipes at very high pressures. Slickwater is 98-99.5% water but is mixed with

additives such as detergents, salts, acids, alcohols and lubricants to make the fluid flow better inside the pipe. Better flow equals higher pressure. Slickwater also contains disinfectants as well as sand and ceramic particles, which are used to keep the fractures open. The horizontal pipe is equipped with holes that can be opened and closed. Once the pressurized fracking fluid is in the horizontal pipe, the holes open and the fluid is forced out into the rock at pressures great enough to create fractures (cracks) in the surrounding rocks. During this time, the sand and ceramic particles are



Fracking in North Dakota. Photo credit: Joshua Doubek

expelled into the small cracks, keeping them open ensuring that the gas and oil can flow freely without the operators continually applying pressure. The cracks allow oil and gas to escape back into the pipe then up to the surface. Think of a door separating two rooms, one filled with air and the other, with water. The door separating the rooms wants to stay closed but if you apply enough force (pressure) it will open. Once the door opens, the water will flow into the other room. To keep the door open, you can either continue to apply pressure, or stick your foot between the door and the frame. In fracking, the initial pressure is applied by the slickwater exiting the pipes, and the sand and ceramics are used to keep the cracks open allowing the flow to continue without applying additional pressure.

Once the pumping process is complete, gas and oil are pumped back to the surface along with the “**flowback**” liquid. Flowback liquid is a mixture of water and contaminants, such as “radioactive materials, heavy metals, hydrocarbons, and other toxins” that came from rocks. A portion (15-50%) of the slickwater that is pumped into the rock returns as flowback. This liquid is then sent to a wastewater site for treatment.

Once fracking is complete in an area, the wells are filled with cement and the equipment removed. In some cases, the pipe is cut below the surface while in others; the wellhead is left on site.



Wellhead left after fracking equipment has been removed. Photo credit: Joshua Doubek

Why Fracking?

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Not all countries have welcomed fracking however. In France, Bulgaria, Germany, and Scotland, fracking has been **banned** for environmental reasons.

Controversy

The environmental impact of fracking will be discussed in the next section. In this section, other controversies surrounding fracking will be examined. One such controversy is the financial impact of treating the flowback liquid at wastewater sites. Small town water treatment facilities may be unable to afford flowback treatment and therefore, must either store it or send it elsewhere. Treatment is very important as flowback liquid contains radioactive materials, heavy metals, etc. that can be very harmful if left untreated.

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Another controversy surrounding fracking is the amount of natural gas left on earth. Despite the fact that the amount of natural gas left is difficult to estimate, Advanced Resource International (ARI) estimates that at the rate at which natural gas is being consumed, we may only have enough to last us another 65 years.

The Impact of Fracking on the environment

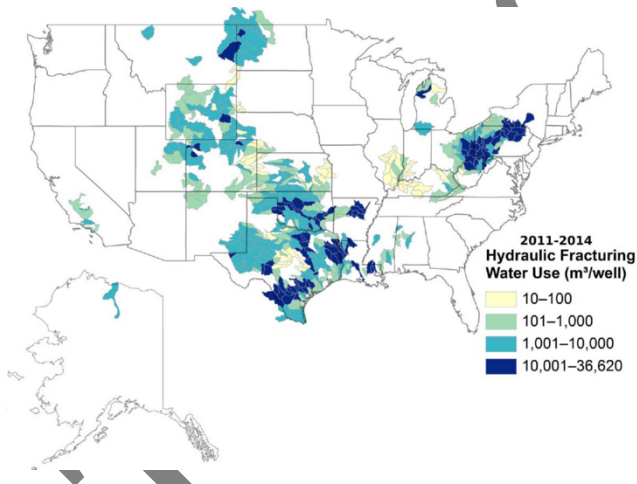
Fracking has been banned in some countries due to environmental concerns such as air pollution, drinking water contamination, loss of clean water and earthquakes. Although fracking has shown short-term success, it may be harmful in the long run.

Air pollution at fracking sites has been found to possibly increase cancer risk; irritate the eyes, nose, and throat; harm the nervous, respiratory, and immune systems; lead to anemia and immunological problems; harm reproductive health; cause birth defects and hinder child development.

Peer-reviewed studies also suggest that fracking may lead to drinking water contamination. **Methanol** and **diesel compounds** were found in water samples that may have been contaminated in areas where operators had stored chemicals. However, scientists state that more studies are needed to confirm that these materials were present in harmful amounts.



When fracking occurs, liquid is pumped into the ground to break apart the rocks underneath. This negative effect is two-fold. Firstly, you must use a tremendous amount of fresh water in this process, most of which is lost to the surrounding rock (see image left).



Secondly, anytime you disrupt rock 1 – 2 miles under the surface, it can create problems. There have been mixed views on whether fracking can cause significant earthquakes but there is no question that fracking can induce minor ones which may or may not be noticeable. There is no clear conclusion but some studies suggest that if small

earthquakes caused by fracking continue at the current rate, dangerous earthquakes may result.

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The Future of Fracking

In the near future, fracking in many countries seems as though it will go unchanged. It is simply too profitable for the companies that do it and too necessary for us to keep up with our ever-increasing energy needs. Considering how our population is growing and our need for energy is likewise increasing, without a viable alternative, fracking will continue.

Reading Comprehension Questions

1. Why is it
2. Explain how a fracking well is created.
3. What
4. What are the functions of the sand and ceramic components of the slickwater?
5. What impact
6. What
7. What

Extension Questions

8. Do you believe
9. Do your own
10. Based on what you found in number 9 above, what do you think about fracking? Use these talking points and explain your answer: a) Should we continue to use fracking? Is the process friend or foe as stated at the top of this article? Is fracking's bad reputation deserved?
11. The potential

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References

- Aloulou, F. and Zaretskaya, V. (n.d.) "What is Shale Gas?" *Geology.com, Energy Information Administration*. Retrieved August 15th, 2016 from <http://geology.com/energy/shale-gas/>
- Charlez, Philippe A. (1997). "Rock Mechanics: Petroleum Applications, Volume 2." *Editions Technip*. P. 239. Retrieved August 14th, 2016 from https://books.google.com/books?id=NigwG_BYRsYC&pg=PA239#v=onepage&q&f=false
- Good, K. (2015). "These 4 Countries Have Banned Fracking...Why Can't the US Get On Board?" *One Green Planet*. Retrieved August 15th, 2016 from <http://www.onegreenplanet.org/environment/countries-except-united-states-that-have-banned-fracking/>
- Inman, M. (2014). "Natural gas: The Fracking Fallacy." *Nature*. Retrieved August 15th, 2016 from <http://www.nature.com/news/natural-gas-the-fracking-fallacy-1.16430>
- Jolly, D. (2013). "France Upholds Ban on Hydraulic Fracturing." *New York Times*. Retrieved August 14th, 2016 from <http://www.nytimes.com/2013/10/12/business/international/france-upholds-fracking-ban.html>
- Lallanilla, M. (2015). "Facts About Fracking." *Live Science*. Retrieved August 14th, 2016 from <http://www.livescience.com/34464-what-is-fracking.html>
- Nunez, C. (2013). "How Has Fracking Changed Our Future?" *National Geographic*. Retrieved August 15, 2016 from <http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/big-energy-question/how-has-fracking-changed-our-future/>
- Petersen, M.D., et al. (2016). "2016 one-year seismic hazard forecast for the Central and Eastern United States from induced and natural earthquakes." *US Geological Survey*. Open-File Report 2016-1035. Retrieved August 15, 2016 from <https://pubs.er.usgs.gov/publication/ofr20161035>
- Srebotnjak, T. and Rotkin-Ellman, M. (2014). "Fracking Fumes: Air Pollution from Hydraulic Fracturing Threatens Public Health and Communities." *Natural Resources Defense Council*. Retrieved August 15th, 2016 from <https://www.nrdc.org/sites/default/files/fracking-air-pollution-IB.pdf>
- Vaidyanathan, G. (2016). "Fracking Can Contaminate Drinking Water." *ClimateWire, Scientific America*. Retrieved August 15th, 2016 from <http://www.scientificamerican.com/article/fracking-can-contaminate-drinking-water/>