

# FRACKING FACTS AND FEARS

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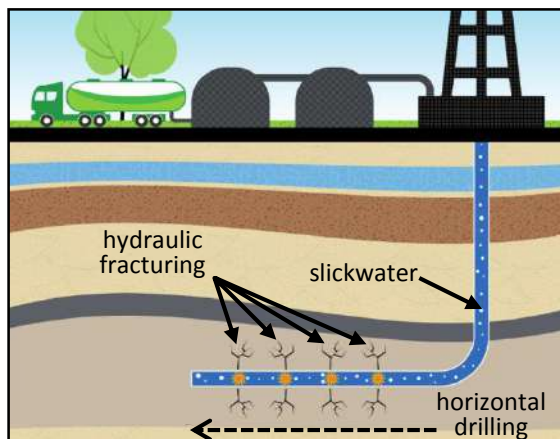
(1) Fracking is short for hydraulic fracturing which involves breaking apart underground rock using a pressurized water mixture which helps to extract natural gas and oil. The first experiments with fracking began in the 1940s, but the controversy over fracking has grown as fracking has become more widely used.

(2) In conventional land drilling for fossil fuels, a large reservoir of pooled gas or oil is identified and then a drill is used to create a vertical wellbore (tunnel) to reach the reservoir. Once the reservoir is penetrated, the free flowing oil or gas can be pumped out. Fracking is a way of obtaining fossil fuels which aren't found in large pools. These hard to reach fuels are trapped in the tiny spaces between fine grains of sedimentary rock called shale. Shale gas and shale oil is found in this rock.

(3) Initially, fracking begins like conventional drilling through the creation of a vertical wellbore which is kept open by a steel tube encased in cement. This acts like a huge drinking straw. In fracking, after the wellbore is drilled downwards and reaches the shale layer, the drill then makes a 90 degree turn and begins drilling horizontally across the shale gas or oil reservoir. The horizontal drill extends for hundreds to thousands of meters. When horizontal drilling became widespread in the 1990s, fracking came into mainstream use.

(4) A *fracking fluid* is then pumped into the wellbore under very high pressure, sometimes exceeding 9000 pounds per square inch (62 050 kilopascals). The fluid cracks or "fractures" the shale causing large gaps where the oil and gas can flow out. The fracking fluid flushes into the cracks and forces the shale gas or oil into the wellbore where it is pumped back up to the surface along with the fracking fluid. The cracks also release *produced water* which is water that's been trapped in the shale for millions of years. Together the fracking fluid, produced water, and the fossil fuels that come to the surface are called the *flowback*.

(5) The fracking fluid, also called *slickwater*, is made of 3 basic components. The major one is water, which makes up over 90% of the fracking fluid. The second component is *proppant*, which is made up of sand or small



ceramic pellets that lodge themselves into the cracks to prevent them from collapsing. Together, the water and proppant make up 99% of the slickwater. The last component in the slickwater is the fracking chemicals.

(6) These fracking chemicals can include things like friction reducers, such as polyacrylamide, which increase the speed of water flow. This allows the fluid to be pumped at a higher velocity and pressure, creating more force for fracturing the shale. Biocides (which are chemicals that kill micro-organisms) like bromine, naphthalene and methanol are added to stop microbes from growing and clogging up the cracks in the shale. Surfactant chemicals like butanol and ethylene glycol monobutyl ether are used to keep the proppant suspended in the slickwater (so it doesn't settle to the bottom of the fluid due to gravity). Scale inhibitors, like hydrochloric acid and ethylene glycol, are added to prevent the chalky build up of scale deposits along the walls of the wellbore, which would narrow it and decrease the fluid flow speed due to increased friction.

(7) Those against fracking bring up the following concerns: 1) This technique requires the use of a huge amount of fresh water at a time when water supplies are increasingly limited. 2) The water in the flowback is considered permanently contaminated wastewater. Along with the fracking chemicals in the flowback, the produced water carries toxic minerals containing heavy metals and radioactive elements from the shale. Without fracking, these toxic materials would have

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stayed buried in the shale. The flowback wastewater must be treated and stored underground, but it can never be released safely back into nature. There are fears that contaminated waste water can find its way into drinking water supplies. 3) You have to destroy natural habitats aboveground to install fracking drill rigs and infrastructure. 4) Fracking is being linked to causing earth tremors and small earth quakes in areas of the world which are traditionally seismically stable. 5) Fracking allows more fossil fuels to be obtained and burned leading to more greenhouse gas emissions which promote climate change. 6) The emphasis on this type of fossil fuel takes the focus away from trying to find renewable solutions for our energy needs.

(8) With all of these serious concerns, some countries like Germany, France, Scotland and Bulgaria, have banned fracking and many others have halted the practice until further safety studies can be done. Still, some nations are moving forward with and intensifying their use of fracking. In the United States, fracking has been aggressively pursued. The American government wants a secure domestic source of oil and gas so that it doesn't have to depend on foreign supplies, and also so that it doesn't have to use coal which is much more polluting than oil or gas. However, some states like Vermont, New York and Maryland view the risks as too great and have banned fracking, while other states are beginning to rethink their adoption of this technique.

## Article Questions

- 1) What is the difference in the fossil fuels extracted from conventional drilling and the fossil fuels extracted using fracking?
- 2) List the three main components in slickwater.
- 3) If slickwater is used for fracking, but the proppant is mistakenly left out of the slickwater, how would this effect the fracking process?
- 4) Flowback wastewater is disposed of in a process called deep-well injection, which pumps large quantities of wastewater down into porous sandstone and limestone rock formations underground. What potential problems could result from this?
- 5) What two things makes the flowback wastewater too contaminated to return to the natural environment?
- 6) Which one of the risks involved in fracking concerns you the most and why?
- 7) What can the United States do to decrease fracking, yet meet its energy needs in the future?