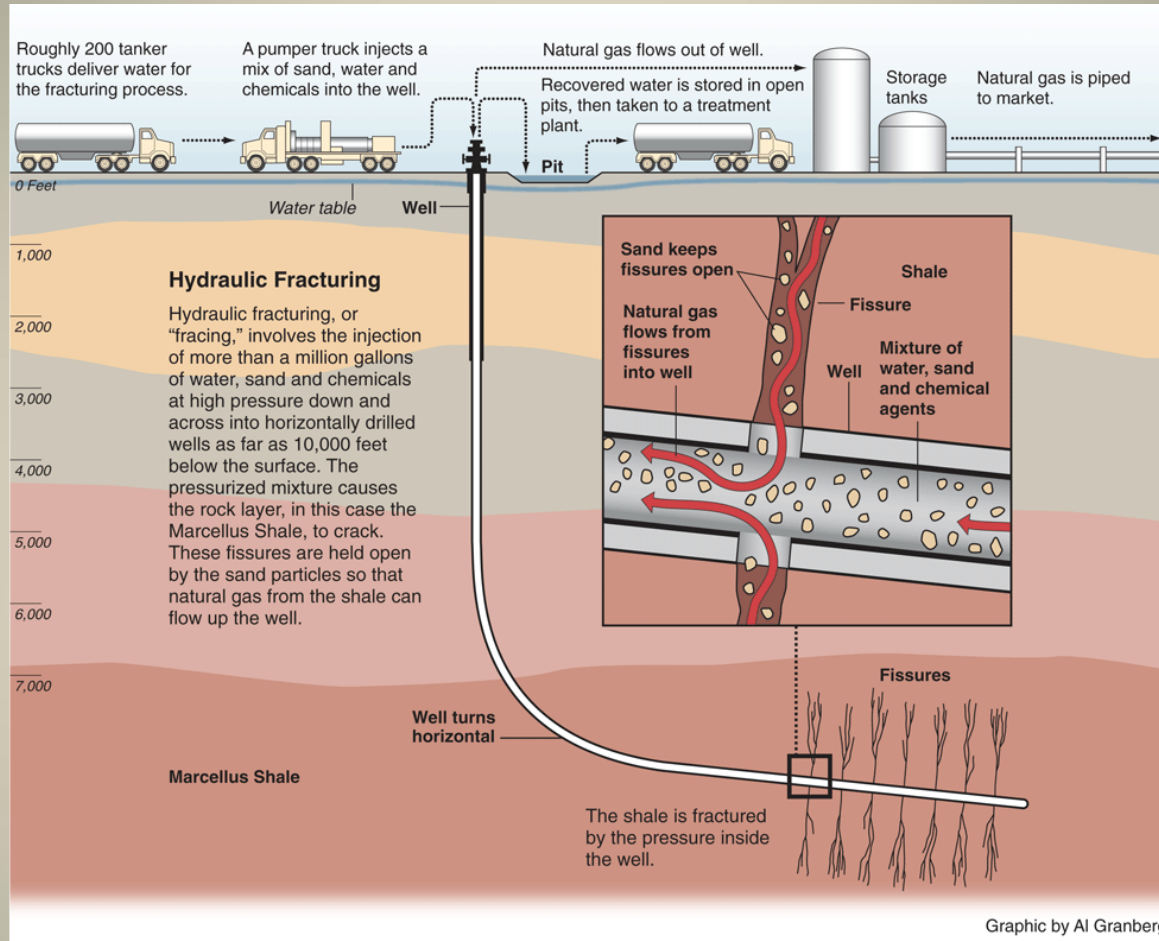


# Fracking:

## The Beginning of the End for Natural Gas

By Daniel Gregory

# What is Fracking?



<http://www.youtube.com/watch?v=c8bZxH-N63M&feature=relmfu>

(Exxon Mobil - Hydraulic Fracturing Explained)

# History of Natural Gas

- 1,000 BC – The Oracle of Delphi
- 400 BC – Chinese first to use Natural Gas for fuel.
- 1785 – First use of Gas for illumination.
- 1870 – Pittsburg becomes first city to use Gas instead of coal.
- 1945 – Postwar technology allows building of interstate pipelines.
- 1985 – Deregulation of the gas industry begins.
- 2001 – Fracking begins.
- 2005 – Energy Policy Act of 2005 is passed with the “Haliburton Loophole”.



# Properties of Natural Gas

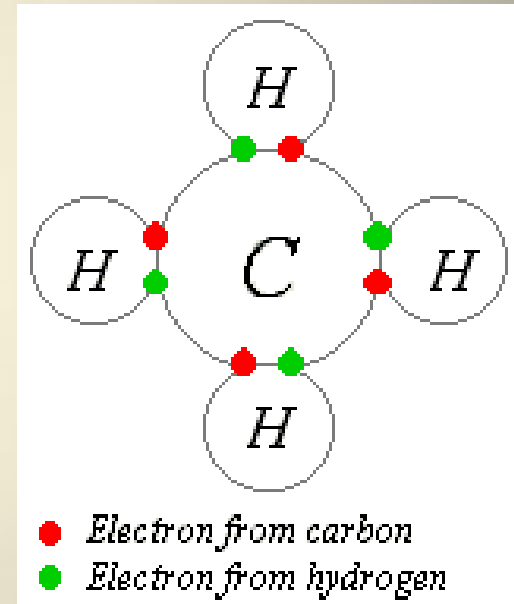
Comprised mostly of methane

Easy to refine for use as fuel

Cleanest burning of all fossil fuels

No carbon dioxide emissions

Nitrous oxide is the only by-product

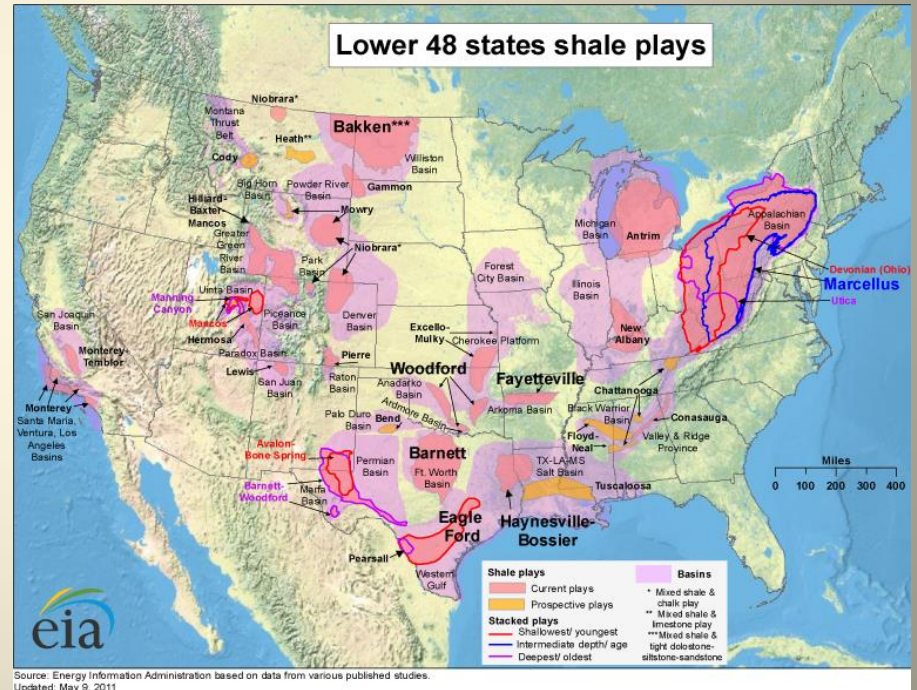


# U.S. Natural Gas Mining History

Natural gas first discovered while mining for oil.

Before pipelines, natural gas use limited to “local use”.

Interstate pipeline expansion allowed for more widespread use of natural gas.



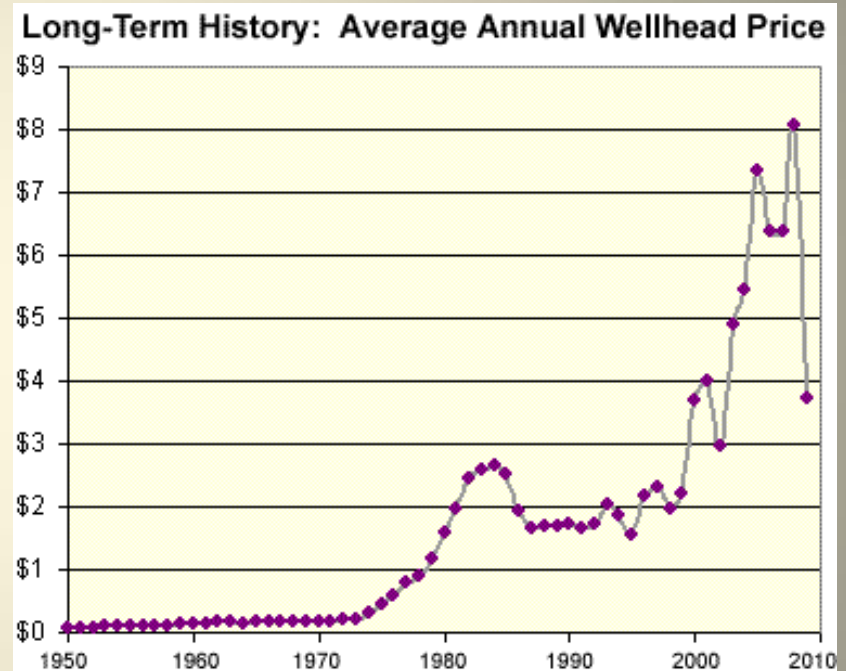
# Government Regulation

Early natural gas market considered a “monopoly”.

Government regulations to protect consumers began in the 1940’s.

Over-regulation led to changes in policy in early 1980’s.

Dwindling reserves lead to further deregulation in the Energy Policy Act of 2005.



<http://www.youtube.com/watch?v=QRNRHdVwRFI>

(NY State Legislature Testimony)

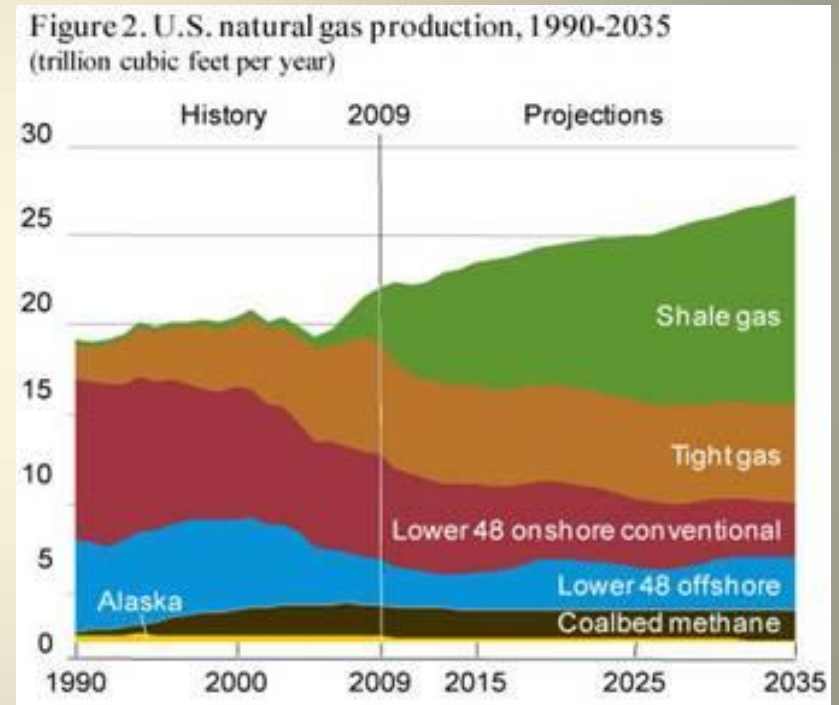
# The Fracking Controversy Begins

Dwindling supply and increasing demand = desperate measures.

The “Haliburton Loophole”.

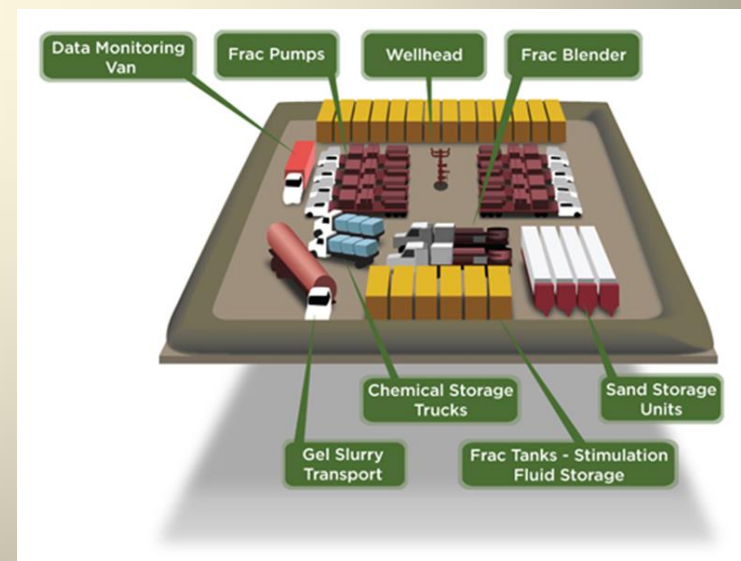
Fracking operations exempted from Clean Water Act and Clean Air Act.

Disclosure of chemicals used in fracking also exempted.



# Chemicals Associated with Fracking

2-Dibromo-3-Nitrilopropionamide -	Algecide
2-butoxyethanol -	Carcenogin
2-methyl-4-isothiazolin-3-one -	Biocide
Acetic Acid -	Vinegar (weak acid)
Acetic Anhydride -	Explosive when mixed with H Peroxide
Alphatic acid	
Polyglycol Ether -	Surfactant (lowers H <sub>2</sub> O surface tension)
Ammonia Sulfate -	Breaks down into ammonia
Aromatic Hydrocarbon -	Benzine
Aromatic Ketones -	Benzine family
Boric Acid (Boron) -	Pesticide
Dazomet -	Pesticide
Ethylene Glycol -	Antifreeze
Formaldehyde -	Preservative
Hydrogen Peroxide -	see Acetic Anydride
Hydrochloric Acid -	Strong acid
Isopropal Alcohol -	Cleaning agent
Methanol -	Toxic, can cause blindness
Monoethanolamine -	Toxic to CNS, Liver, Kidneys, Lungs
Polyethenine Glycol -	Surfactant
Potassium Hydroxide -	Drain Cleaner
Sodium Chloride -	Used as drilling fluid
Sodium Hydroxide -	Caustic Soda, causes chemical burns
Tetramethylammonium Chloride -	Harmful if inhaled, Fatal if swallowed



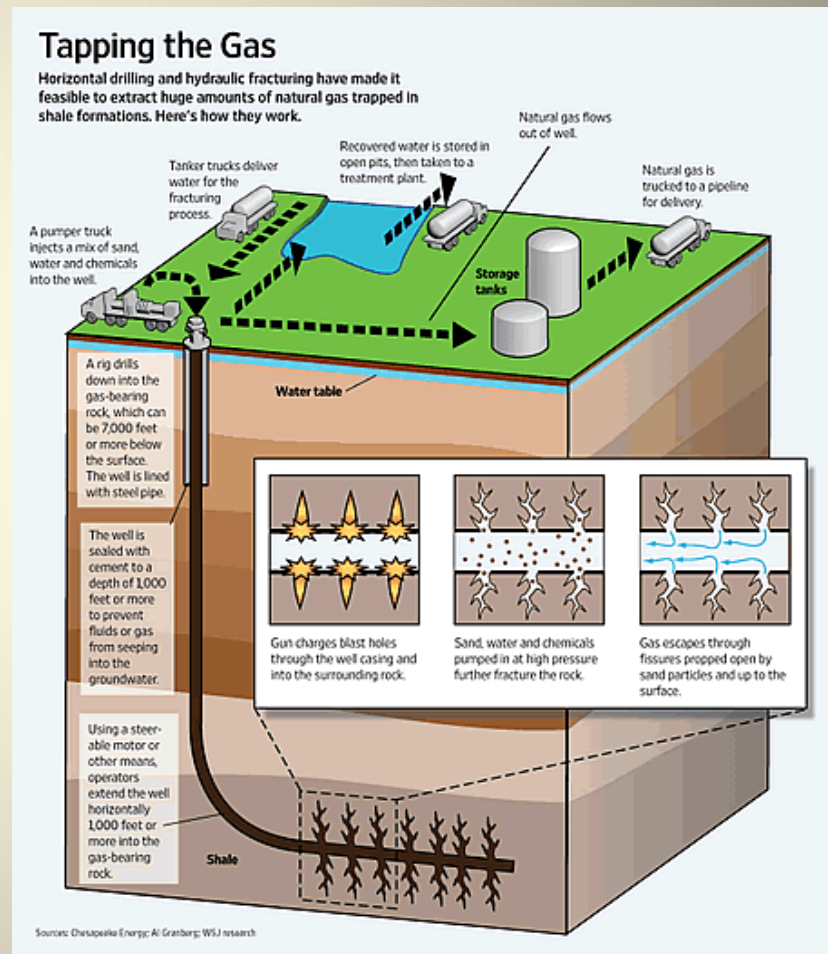


# The Real Fracking Operation

- First 1,000' of gas well is lined with concrete to prevent leakage.
- Trucks deliver water and fracking chemicals to drilling site.
- Shale is fractured and the water/chemical mix is pumped in.
- Natural gas flows back up the well to the surface, along with the toxic water/chemical mix.
- The untreated water is “stored” in an open pit until it can be hauled away.

<http://www.youtube.com/watch?v=X8du6pQbvyo&feature=relmfu>

(Exxon Mobil public service commercial)



# Documented Harm to People and the Environment

Colorado:

Laura Amos: Contaminated well water

Susan Wallace-Babb: Exposure to fracking chemicals

Texas:

Contaminants found in air and water samples in town of Dish

Pennsylvania:

Cement casings in 20 gas wells fail, contaminating ground water for entire town with methane.

<http://www.youtube.com/watch?v=ptlVKSxpfA>

(Gasland)

## Bibliography

- Colborn, T., Kwiatkowski, K., Schultz, K., & Bachran, M. (2011, September 20). Natural Gas Operations from a Public Health Perspective. *International Journal of Human and Ecological Risk Assessment*. 17. Retrieved from <http://www.tandfonline.com/doi/abs/10.1080/10807039.2011.605662>
- Howarth, R. W., Ingraffea, A., & Engelder, T. (2011, September 15). Should Fracking Stop?. *Nature*, 477. Retrieved from <http://www.nature.com/nature/journal/v477/n7364/full/477271a.html>
- Lustgarten, A. (2011, September 29). The Trouble With Health Problems Near Gas Fracking. Retrieved from <http://www.npr.org/2011/09/29/140872251/the-trouble-with-health-problems-near-gas-fracking>
- MacAvoy, P. W. (2000). *The Natural Gas Market: Sixty Years of Regulation and Deregulation*. New Haven, CT: Yale University Press.
- Nersesian, R. L. (2007). *Energy for the 21<sup>st</sup> Century: A Comprehensive Guide to Conventional and Alternative Sources*. Armonk, NY: M.E. Sharpe, Inc.
- Parker Waichman Alonso LLP. (2011). Hydraulic Fracturing- Fracking Contamination Lawsuits. Retrieved from [http://www.yourlawyer.com/topics/overview/hydraulic\\_fracturing\\_fracking?gclid=CPTa7-SHz6sCFcm77QodRx1yUQ](http://www.yourlawyer.com/topics/overview/hydraulic_fracturing_fracking?gclid=CPTa7-SHz6sCFcm77QodRx1yUQ)
- Roach, J. (2001, August 14). Delphic Oracle's Lips May Have Been Loosened By Gas Vapors. Retrieved from [http://news.nationalgeographic.com/news/2001/08/0814\\_delphioracle.html](http://news.nationalgeographic.com/news/2001/08/0814_delphioracle.html)
- Secretary of Energy Advisory Board Shale Gas Subcommittee. (2011, August 11). The SEAB Shale Gas Production Subcommittee Ninety-Day Report. Retrieved from [http://www.shalegas.energy.gov/resources/081111\\_90\\_day\\_report.pdf](http://www.shalegas.energy.gov/resources/081111_90_day_report.pdf)
- Soraghan, M. (2011, May 13). Baffled About Fracking? You're Not Alone. Retrieved from <http://www.nytimes.com/gwire/2011/05/13/13greenwire-baffled-about-fracking-youre-not-alone-44383.html?pagewanted=all>
- TEDX The Endocrine Disruptor Exchange. (2011). Chemicals in Natural Gas Operations. Retrieved from <http://www.endocrinedisruption.com/chemicals.introduction.php>
- Vaughn, J. (2007). *Conflicts Over Natural Resources*. Santa Barbara, CA: ABC-CLIO, Inc.
- Vaughn, J. (2007). *Environmental Politics: Domestic and Global Dimensions*. Belmont, CA: Thompson Wadsworth.