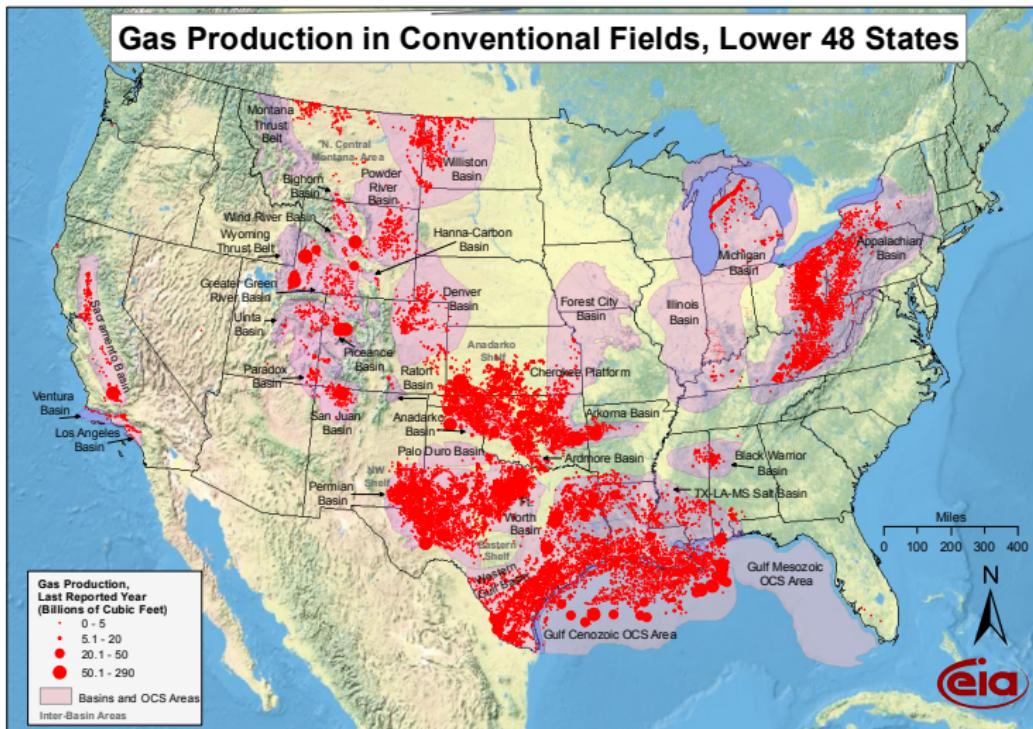


Introduction to Natural Gas

James Woods

Where is it produced? Just conventional



Source: Energy Information Administration based on data from HPDI, IN Geological Survey, USGS
Updated: April 8, 2009

Figure 1:

More in the shale areas.

Shale plays in the Lower 48 states

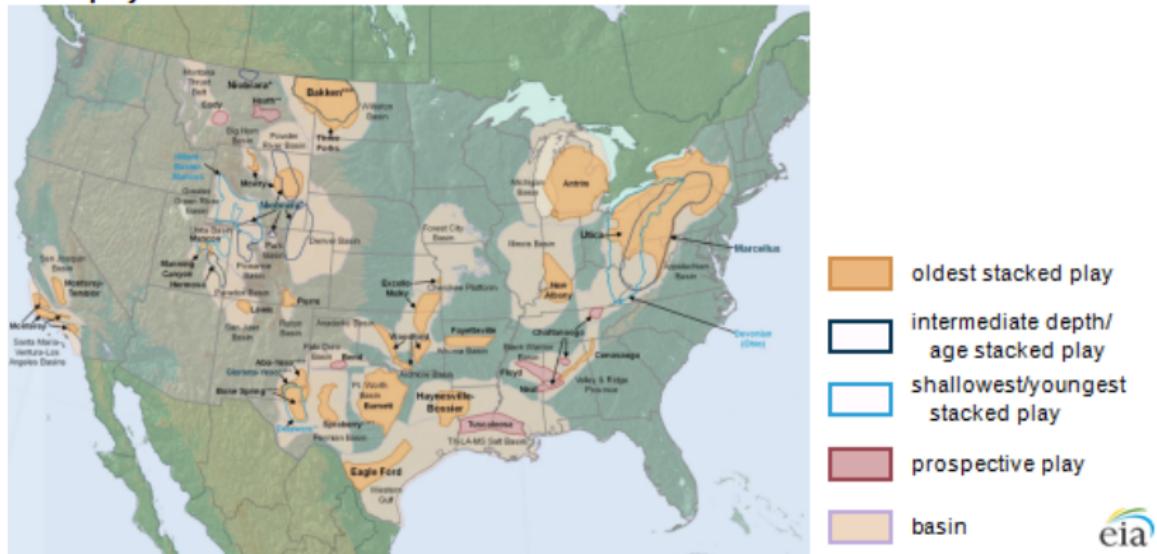


Figure 2:

Fracking Well. Will see with oil well with associated gas



Figure 3:

How do you move it within the US? Pipelines (Interstate only).

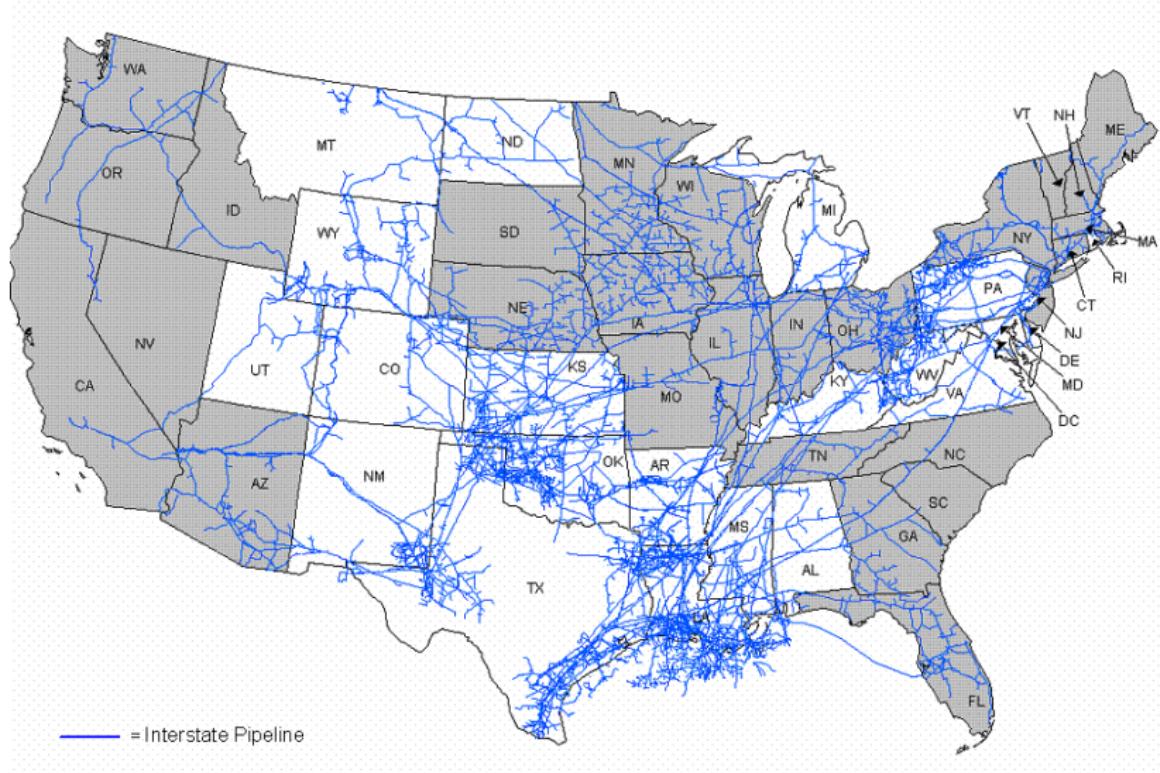


Figure 4:

What about those pipelines?

- ▶ There are more intrastate pipelines than shown, plenty in TX and CA but also other states
- ▶ Read more here
https://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/transcorr.html
 - ▶ Picture pipes ranging from a foot to three+ feet for trunk lines.
 - ▶ Compressor stations every 50-100 miles, ~1,500 total
 - ▶ 200 psi to 1,500 depending
- ▶ They are privately owned https://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/MajorInterstatesTable.html
 - ▶ Open access, posted prices, is a thing.
 - ▶ For intrastate, within, state PUC regulate
 - ▶ For interstate, FERC regulates (You can find current Tariffs at <http://etariff.ferc.gov/TariffList.aspx>)

Compressors



Figure 5:

Compressor Station



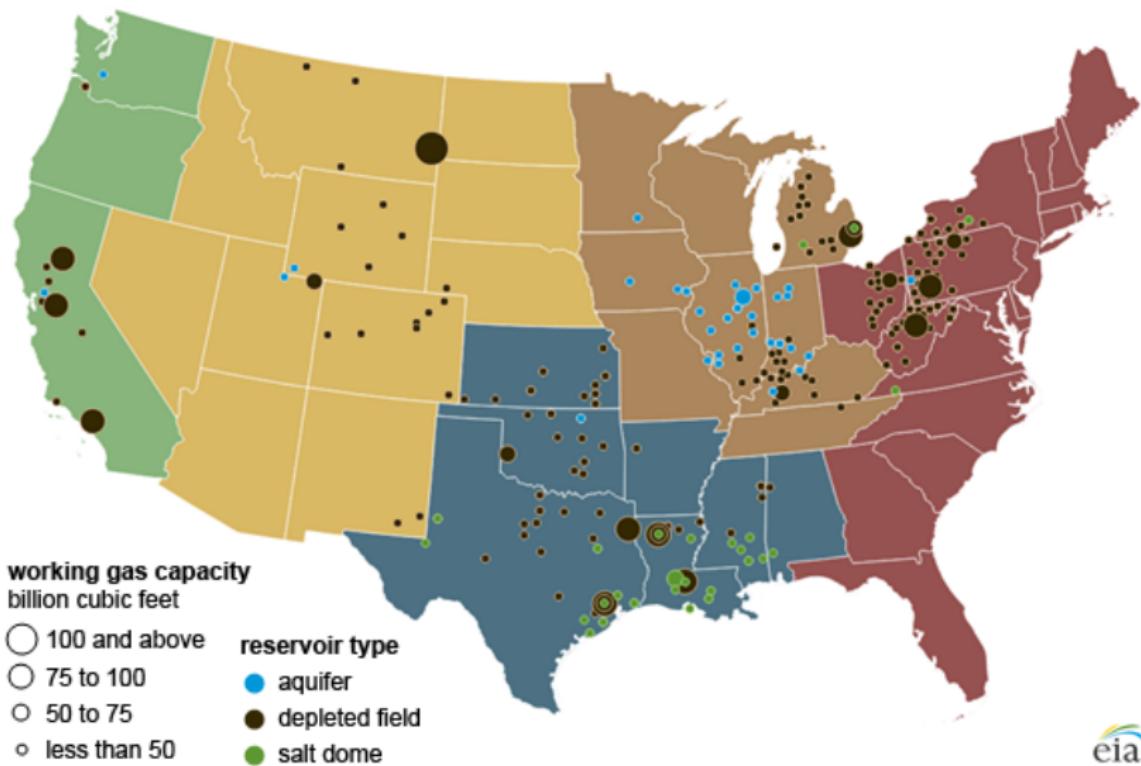
Compressor Station Complex

© www.PaForestCoalition.org

Figure 6:

Storage is important

U.S. underground natural gas storage facilities by type (July 2015)



Most Storage is just old gas wells

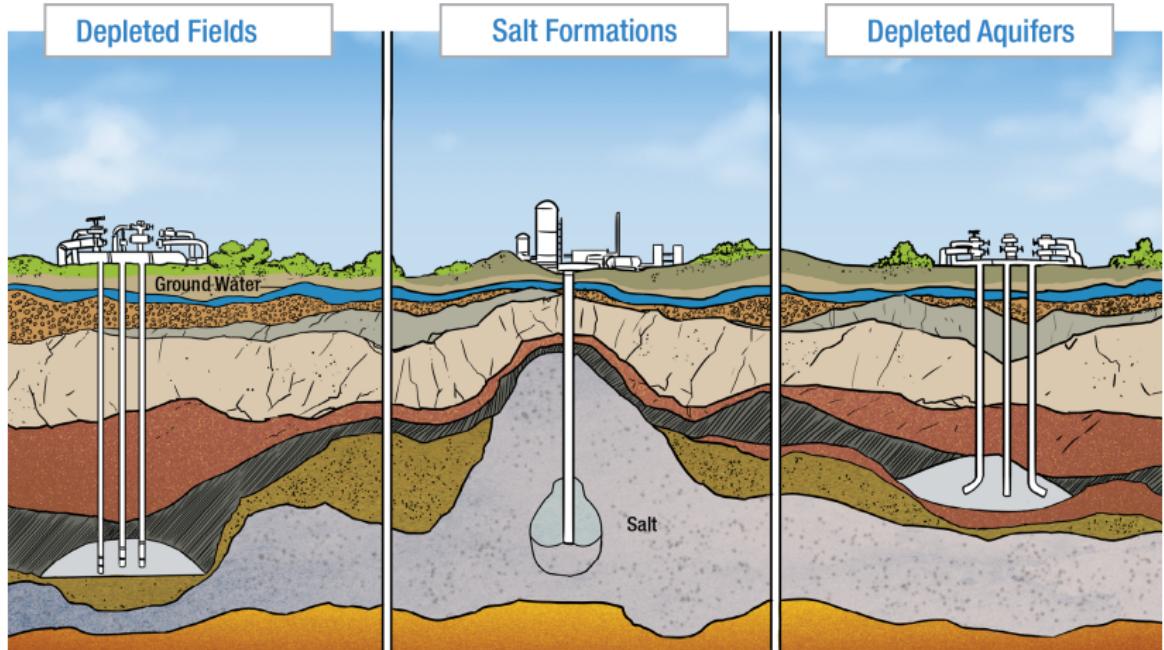


Figure 8:

Storage is very seasonal

There is a weekly report on storage by EIA http:

//www.eia.gov/dnav/ng/hist/nw2_epg0_swo_r48_bcfw.htm

- ▶ Note the seasonality
- ▶ Note the factor of 2+ changes over the term

Hubs, where transactions are made

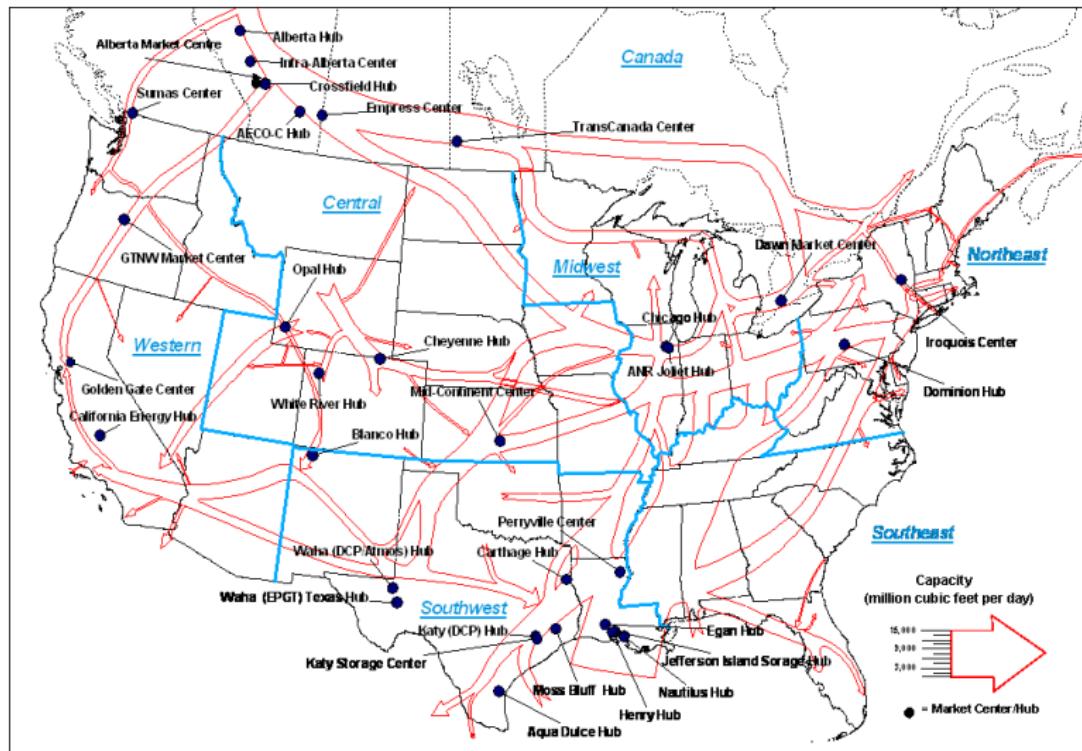


Figure 9:

Part of Henry Hub LA



Figure 10:

Getting to Prices

- ▶ You will see wellhead prices, but
- ▶ Most references prices are at the hubs.
 - ▶ Henry Hub in LA is the most common reference hub for prices
 - ▶ There are fairly firm relationships between other hubs and HH except when there is congestion.
 - ▶ Changes in the usual difference are usually called basis blowout. Term is not specific to energy.
- ▶ Intercontinental Exchange for Gas Itself
 - ▶ <https://www.theice.com/products/OTC/Physical-Energy/Natural-Gas>
- ▶ FERC for transportation tariffs (Regulated)
 - ▶ <http://etariff.ferc.gov/TariffList.aspx>
 - ▶ Some are fixed and some have a market rate component.

It is hard to talk about gas separate from transportation.

Intro Deregulation in Natural Gas

- ▶ Transmission companies used to own the gas.
 - ▶ Buy on one end
 - ▶ Sell on the other
- ▶ Natural Gas Policy Act of 1978 started the process . . . but didn't work well
- ▶ FERC 236 1985 simplified product definitions
- ▶ FERC 636 in 1992 was where it really started.

Key Points about Deregulation in General

- ▶ The point is not to keep hands off and let the markets develop into whatever form they want.
 - ▶ There is a balance between minimizing transactions cost, which your book focuses on, and efficiency.
 - ▶ Markets will tend to reduce transactions cost, merging etc, but that does not make for efficient allocation.
- ▶ The idea is to create market rules that balance allocative efficiency and transaction cost minimization.
 - ▶ Focus on all transactions being visible in some way.
(Competition requires a good information environment)
 - ▶ Focus on reducing market power (Why pipelines can't own the gas in them any more.)
 - ▶ Open access (Law of one price)
 - ▶ Put a price on everything
 - ▶ Storage
 - ▶ Timing and reliability of transport access
 - ▶ Unbundling of prices.

Transactions Cost Economics

Goes back to Coase 1937 (Nobel). Williamson (Nobel also). Elinor Ostrom (Nobel too).

This just in Hart and Holstrom (2016 Nobel)

Transactions are not cost free:

- ▶ Search and information cost (Coordination)
- ▶ Bargaining (Defining what you want)
- ▶ Enforcement (Getting people to do what they said)
- ▶ Strategic behavior (Hold Up Problem) Transaction specific investments

Minimizing Transaction Cost often means vertically integrating:

- ▶ Merge with your suppliers or with who you supply.
- ▶ Working with only one internal supplier may minimize current costs but may not provide incentives to reduce further.
- ▶ Larger firms often mean more market power in terminal market.

Intent of regulation is to get closer to perfect competition

- ▶ Information rich
- ▶ Minimized market power
- ▶ Information is contained in prices
- ▶ There are a lot of prices
- ▶ Complex trading floor operations to control cost and risk.

Question 1

Give a quick overview of the arguments in this paper.

Culver, Walter J., and Mingguo Hong. "Coal's decline: Driven by policy or technology?" *The Electricity Journal* 29.7 (2016): 50-61.
<http://www.sciencedirect.com/science/article/pii/S104061901630121X>

Question 2

Give a quick overview of the arguments in this paper.

Joskow, Paul L.. 2013. "Natural Gas: From Shortages to Abundance in the United States." American Economic Review, 103(3): 338-43.

<http://stats.lib.pdx.edu/proxy.php?url=https://www.aeaweb.org/articles?id=10.1257/aer.103.3.338>