

The Changing Energy Landscape:

Oil & Gas



Introduction to GIS WebTech



GIS WebTech

- *Atlanta-based company focused exclusively on technology for economic development*
- *Fastest-growing provider with the only technology built natively on Esri's ArcGIS platform*
- *Serve economic development organizations of all sizes, in all regions of the country*
- *Hope to see everyone in Atlanta this fall!*

A Quick Review of Oil & Gas



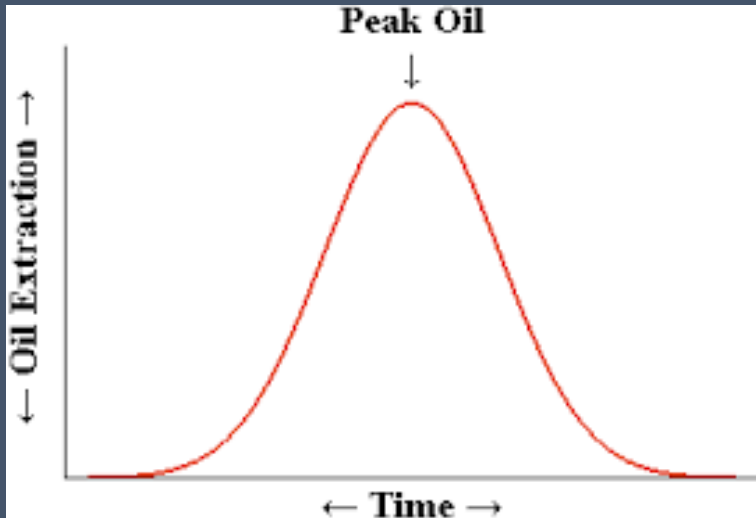
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- 1. *Peak Oil: Are We Running Out?***
- 2. *Shale Gas, Shale Oil and Fracking: What Exactly Are They?***
- 3. *Energy Independence: Is It Feasible?***
- 4. *And What Does All This Mean for Economic Development, Anyway?***

Peak Oil

Wikipedia Definition: the theorized point in time when the maximum rate of extraction of petroleum is reached, after which it is expected to enter terminal decline

Intuitive...Makes Sense...

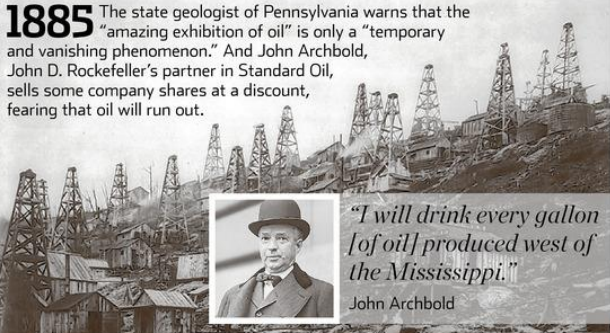



- *Oil is a finite resource*
- *So the amount available (“Supply”) must be fixed*
- *Consumption (“Demand”) will eventually use it up*
- *With demand growing every year the day of reckoning gets closer every year and we will eventually run out*
- *And when demand begins to seriously outrun supply prices will skyrocket, creating scarcity and maybe even societal collapse (e.g. Mad Max)*

First Problem: Peak Oil is a Recurring Prediction

NOT THERE YET
Notable past predictions of peak oil that didn't turn out

1885 The state geologist of Pennsylvania warns that the "amazing exhibition of oil" is only a "temporary and vanishing phenomenon." And John Archbold, John D. Rockefeller's partner in Standard Oil, sells some company shares at a discount, fearing that oil will run out.

"I will drink every gallon [of oil] produced west of the Mississippi."
John Archbold

Source: "The Quest" by Daniel Yergin, 2011
Photo: Library of Congress(2)

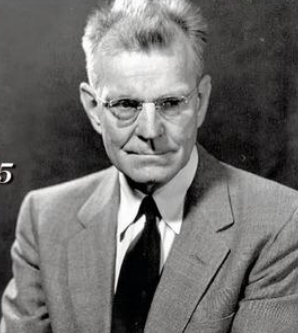
NOT THERE YET
Notable past predictions of peak oil that didn't turn out

1956

M. King Hubbert, a geologist for Shell Oil, says that

U.S. oil production will likely peak between 1965 and 1970 and decline steadily thereafter.

> Output will indeed peak in 1970 and then trend downward—but it will jump by two-thirds from 2009 to mid-2014.

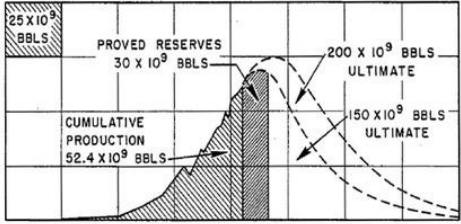


Source: "The Quest" by Daniel Yergin, 2011
Photo: University of Wyoming/American Heritage Center

NOT THERE YET
Notable past predictions of peak oil that didn't turn out

2008 Kenneth Deffeyes, a Princeton University geology professor emeritus, writes in a preface to his book "Hubbert's Peak":

"Welcome to the world beyond Hubbert's peak."



Source: "Hubbert's Peak" by Kenneth S. Deffeyes (2008 edition)
Photo: Nuclear Energy and the Fossil Fuels by M. King Hubbert

1880s: no oil outside Appalachians

1950s: megafields harder to find

2008: oil hits \$100/bbl

1970s: oil crisis

1859: First oil well drilled

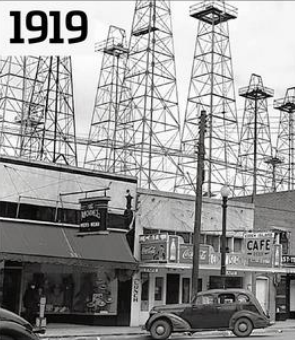
NOT THERE YET
Notable past predictions of peak oil that didn't turn out

1919

"Within the next two to five years, the oil fields of this country will reach their maximum production, and from that time on we will face an ever-increasing decline."

Van H. Manning, director of the U.S. Bureau of Mines

> By the late 1920s, the market will be awash in oil, and the discovery of the giant East Texas oil field in 1931 will create a glut.



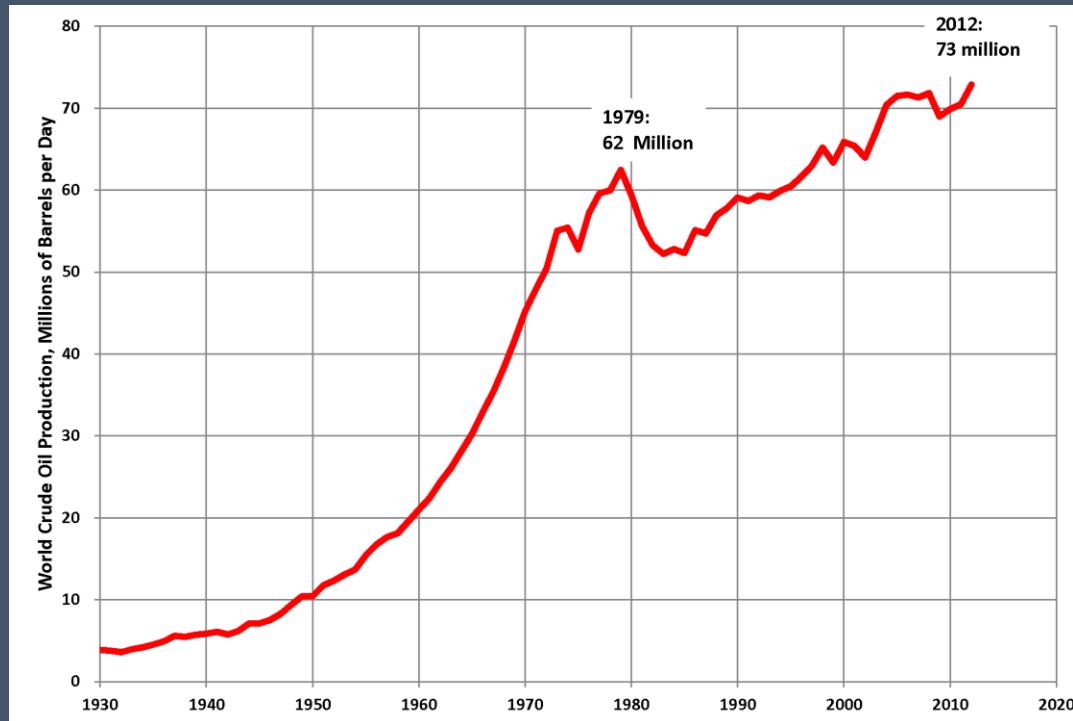
Source: "The Quest" by Daniel Yergin, 2011
Photo: Corbis



Spot the pattern?
Peak oil theories get popularized about every generation

Second Problem: Peak Oil Never Actually Occurs

World Oil Production 1930 - 2012

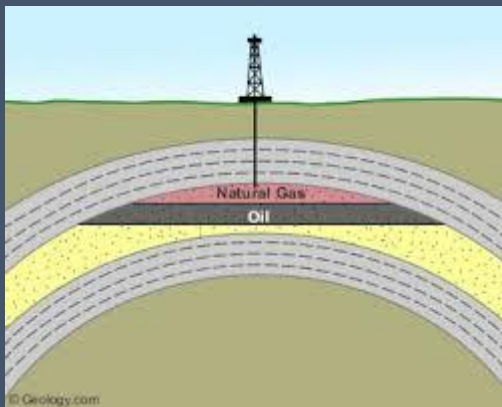


- Growth in oil production is occasionally interrupted but never stops
- Interruptions in growth are caused by recessions (which cause demand to drop) and, rarely, political events
- *But there is no peak...*
- *...why not?*

Sales Gas, Shale Oil & Fracking

Bertasi Definition of Shale: fine-grained mud compacted into a porous, but impermeable, rock

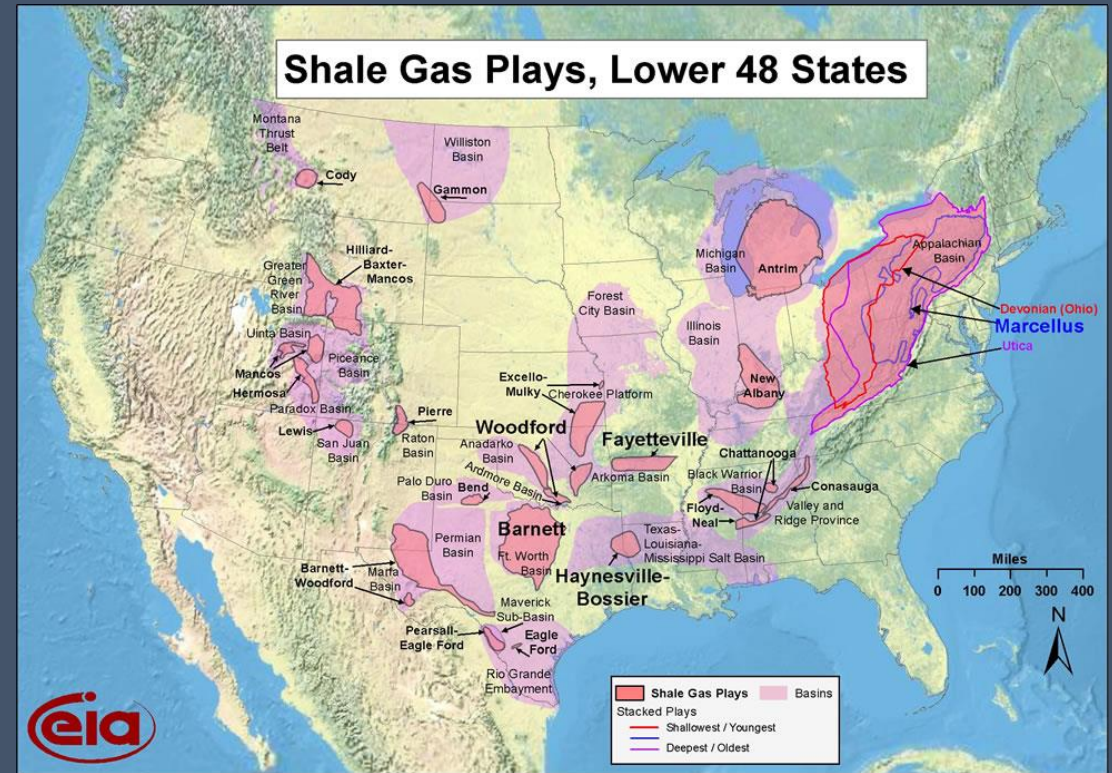
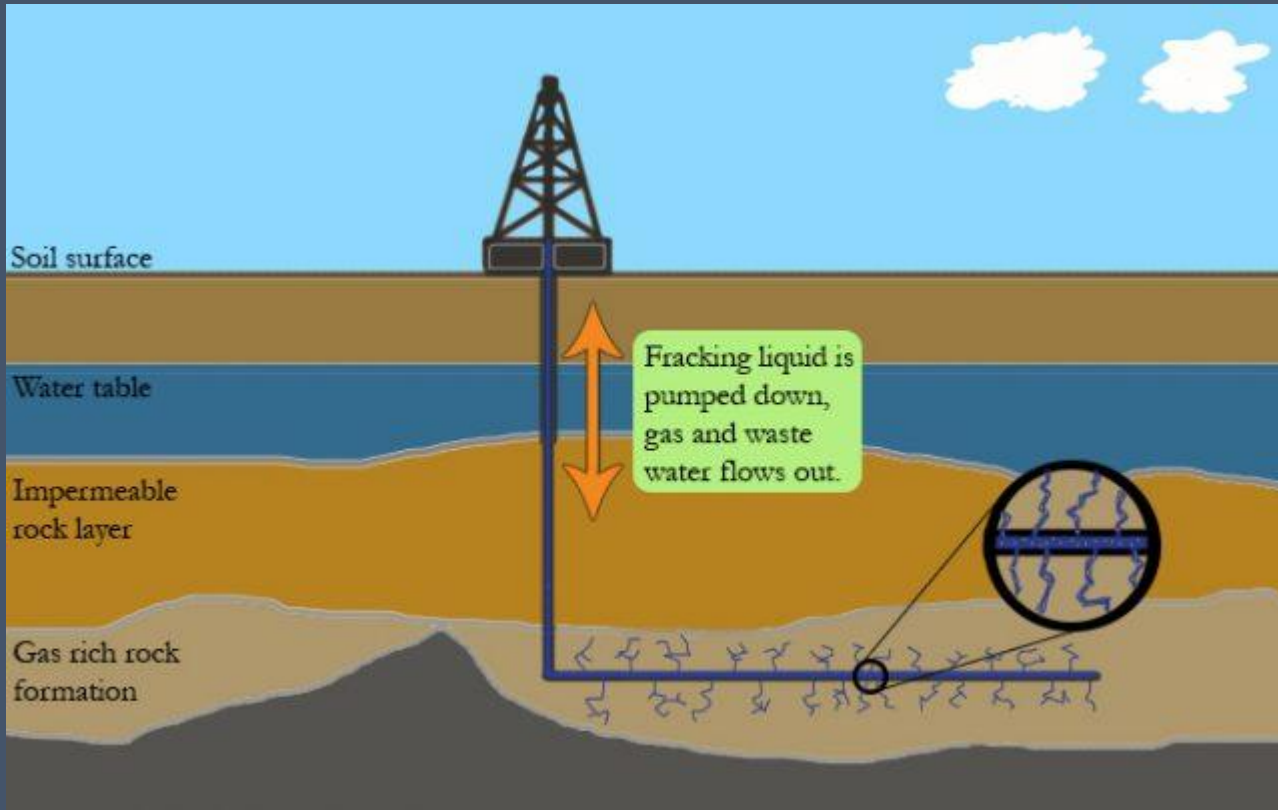
- Geologists have known for over 100 years that shale contains a lot of oil and gas
- But it was never economic to recover because of the rock's impermeability



- Stated another way, you could not get the oil or gas to flow out of the rock into a conventional well
- The oil and gas were, effectively, locked up

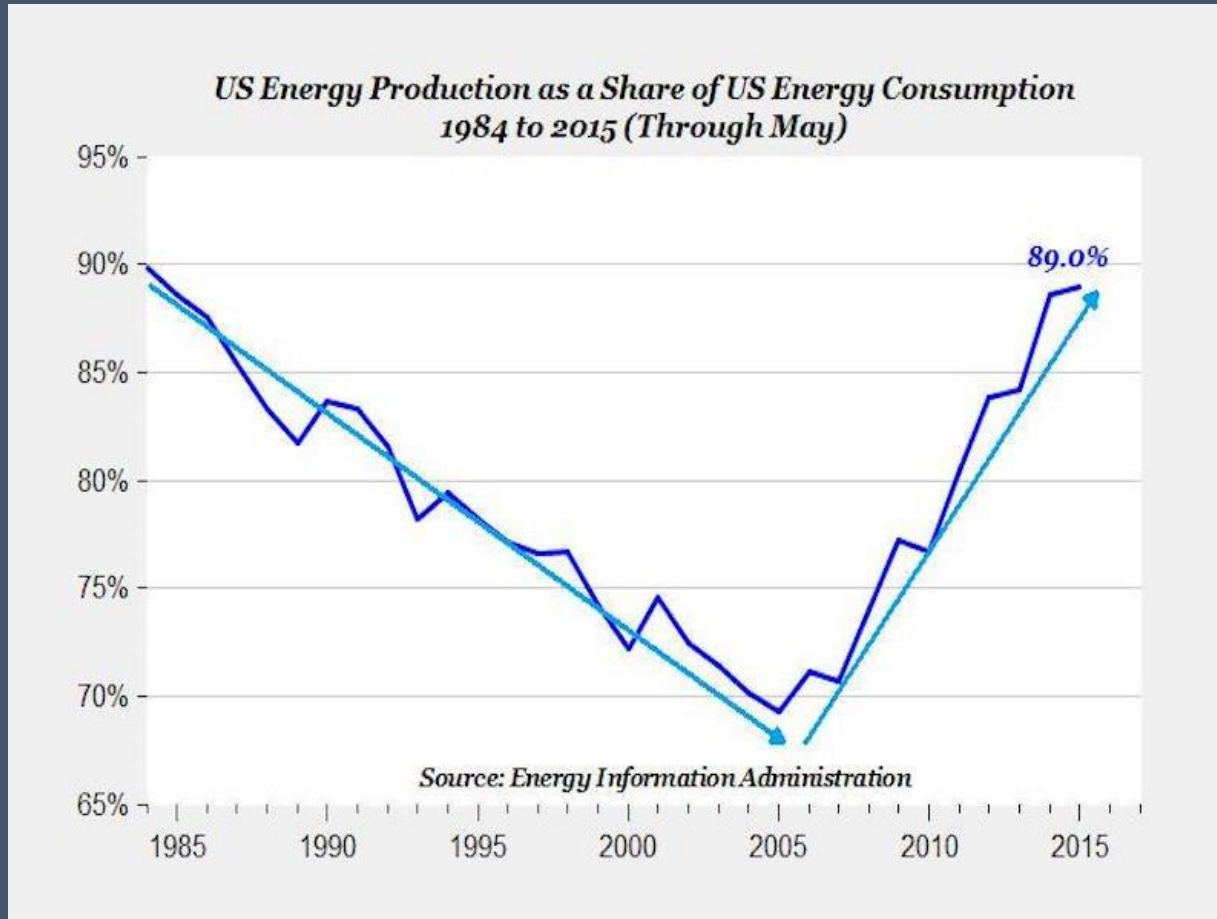
Sales Gas, Shale Oil & Fracking

Technological change, in this case fracking, changed the game by opening up massive new supplies



Source: Energy Information Administration based on data from various published studies. Updated: March 10, 2010

Result? U.S. Approaching Energy Independence



- Recently passed Saudi Arabia and Russia to become the world's largest producer of oil
- Closing in on Russia to become the largest producer of gas
- Now exporting both gas (in the form of LNG) and oil
- Expected to produce more energy than we consume, achieving energy independence, in about 5 years

So What Does This Mean for Economic Development?

- Shale oil and shale gas now have a major impact on local economies in many areas of the country
 - Upstream: Drilling and production benefit local employment and tax base
 - Midstream: Gathering, processing and transmission create construction and permanent jobs and heavy tax base
 - Downstream: Distribution brings lower energy prices, creating economic growth across the board and jobs in energy-intensive industries like chemical manufacturing, fertilizer manufacturing, etc.
 - Export: Multi-billion dollar LNG export terminals
- If your community is close to a shale resource, it could prove attractive to certain energy-intensive industries, and if it is not it is already benefiting indirectly, from lower energy prices

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