

The Unconventional Black Swan: An Opportunity to Measure the Economic Impact of Petroleum Geology*

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Abstract

Today, we are actually producing more gas in the United States than we ever have. Just five years ago or so, few of us thought this was possible. Natural gas is a finite resource, and at some point natural gas production will decline. Now we know it has not already happened; it will happen sometime in the future.

In 2007, Nassim Taleb published *The Black Swan: The Impact of the Highly Improbable*. He coined the term “Black Swan Event” for surprising, high-impact, hard-to-predict events. The Black Swan is a statement of impossibility from the 16th century. Black Swans were believed not to exist until 1697 when one was found in Australia.

Taleb says that Black Swan events have three features,

- 1) they are outliers – they lie outside the realm of normal expectations
- 2) they carry extreme impact.
- 3) they have retrospective predictability – they appear explainable and predictable after the fact.

Examples of Black Swan events are September 11, 2001, when the World Trade Center in New York was destroyed or the advent of the internet. Both were surprising, high-impact, and hard-to-predict events.

By definition, the unconventional resource play is a Black Swan event. First, it is surprising. Who saw the effect it had on U.S. oil and gas production coming? Most of us agreed with Matt Simmons when he said that M King Hubbert’s prediction that U.S. oil and gas production would peak about 1970 had come true and that decreasing U.S. oil and gas production was something we would have to live with. Hubbert’s predictions made sense and appeared to be very close to reality.

Second, the unconventional resource play has seen a high impact. The U.S. is producing more gas than ever and the price dropped from more than \$10 per MCF to less than \$2 per MCF. Just a few years ago, the United States imported 65% of the oil it consumed. Mainly, as a result of the Bakken and Eagle Ford oil resource plays, today the United States imports 45%, and some predict that it will fall to 25% by 2020. Think of what a huge economic impact that is.

Finally, in retrospect, it looks like we should have predicted the significance of resource plays. Hydraulic fracturing technology was improving dramatically with new fluids like “slick-water” and better proppants. Horizontal drilling became main stream.

Why do we miss Black Swan events like resource plays? Taleb says that Black Swan logic makes “what you don’t know far more relevant than what you know”. He says that we have an excessive focus on what we know and that focusing on what we know obscures the importance of the unknown. In his often quoted 1952 paper, “Toward a Philosophy of Oil-Finding,” AAPG Past-President Wallace Pratt stated that the biggest barrier to oil-finding was not technological. He said that the biggest barrier to oil-finding is “the tendency of the human mind to discount or to ignore the significance of what remains unknown to it.” “For him, the disparity between the known and the unknown is unusually large. For him, the need to be always alert to the potentialities of what he does not know is paramount. He must maintain a constant awareness that he does not know everything that may enter into his problem. To assume that our knowledge of an area is complete when it is not, may be to conclude that there is no oil where there is oil.”

In North America, the resource play has caused a seismic shift in exploration objectives. No longer are companies exploring for ‘conventional’ targets; instead they are focused almost entirely on unconventional resource plays. As a result, most North American exploration geologists are prospecting for potential new resource plays exclusively. Outside of North America, industry is just beginning to explore for unconventional plays.

The unconventional play raises a lot questions. For example, will there be a market for conventional plays in the future? When will oil and gas from unconventional resource plays reach its peak? Will resource plays be economical outside North America?

Selected References

Ahlbrandt, T., 2012, The shift from the static hydrocarbon model (Hubbert) to a dynamic model: Re-evaluating the Hubbert curve and the global petroleum revolution: A new era: Search and Discovery Article #70116 (2012): Web accessed May 29, 2013.
http://www.searchanddiscovery.com/documents/2012/70116ahlbrandt/ndx_ahlbrandt.pdf

Borowitz, S., 1999, Farewell Fossil Fuels: Reviewing America’s Energy Policy: Plenum, New York, 220 p.

Campbell, C.J., compiler, 2003, The Essence of Oil and Gas Depletion: Multi-Science Publishing Co., Essex, England, 342 p.

Deffeyes, K.S., 2001, Hubbert’s Peak - The Impending World Oil Shortage: Princeton University Press, 208 p.

Dickey, Parke A., 1958, Oil is found with ideas: Tulsa Geological Society Digest, v. 26, p. 84-101.

Durham, L.S., 2011, Marcellus core areas differentiated: AAPG Explorer, May, 2011. Web accessed May 29, 2013.
http://www.aapg.org/explorer/2011/05may/mar_update0511.cfm

Goodstein, D.L., 2004, Out of Gas: The End of the Age of Oil, 1st ed.: W.W. Norton, New York, 140 p.

Hubbert, M. King, 1956, Nuclear energy and the fossil fuels: Presentation at the Spring Meeting of the Southern District Division of Production, American Petroleum Institute, San Antonio, Texas, March 8, 1956, Publication No. 95. Houston: Shell Development Company, Exploration and Production Research Division, 1956. Web accessed 29 May 2013. <http://www.hubbertpeak.com/hubbert/1956/1956.pdf>

Hubbert, M. King, 1969, Energy resources, in National Academy of Sciences-National Research Council, Committee on Resources and Man, *Resources and Man: A Study and Recommendations*, San Francisco: W.H. Freeman, p. 157-242. Web accessed May 29, 2013.
<http://www.hubbertpeak.com/hubbert/ResourcesAndMan.pdf>

Hubbert, M. King, 1971, The energy resources of the earth, in *Energy and Power*: Scientific American, p. 31-40.

Pratt, W.E., 1952, Toward a philosophy of oil-finding: AAPG Bulletin, v. 36/12, p. 2231-2236.

Simmons, M.R., 2005, *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy*: John Wiley & Sons, 448 p.

Taleb, N.N., 2007, 2010, *The Black Swan: The Impact of the Highly Improbable*: Random House & Penguin, 360 p.

Towler, B., 2011, World peak oil production still years away: Oil & Gas Journal, v. 109/18, p. 90-97.

White, D., 1919, Unmined supply of petroleum in the United States: Journal of the Society of Petroleum Engineers, v. 12/5, p. 361-363.

Selected Websites

DOE, EIA, 2004, U.S. Natural Gas Imports and Exports: 2004, Web accessed August 6, 2013.
http://www.eia.gov/pub/oil_gas/natural_gas/feature_articles/2005/ngimpexp/ngimpexp.pdf

Masters, John, with Leslie Haines, 2008, Chatting with John Masters: Oil and Gas Investor.com, http://www.oilandgasinvestor.com/OGI-Magazine/Chatting-John-Masters_4169?ch=more-title Web accessed August 6, 2013.

The Unconventional Black Swan:

**An Opportunity to Measure the
Economic Impact of
Petroleum Geology**

“Crazy” Edwin Drake



Titusville, PA, 1859

Range Resources Sign at Pittsburgh Airport



Bill Zagorski and the Marcellus



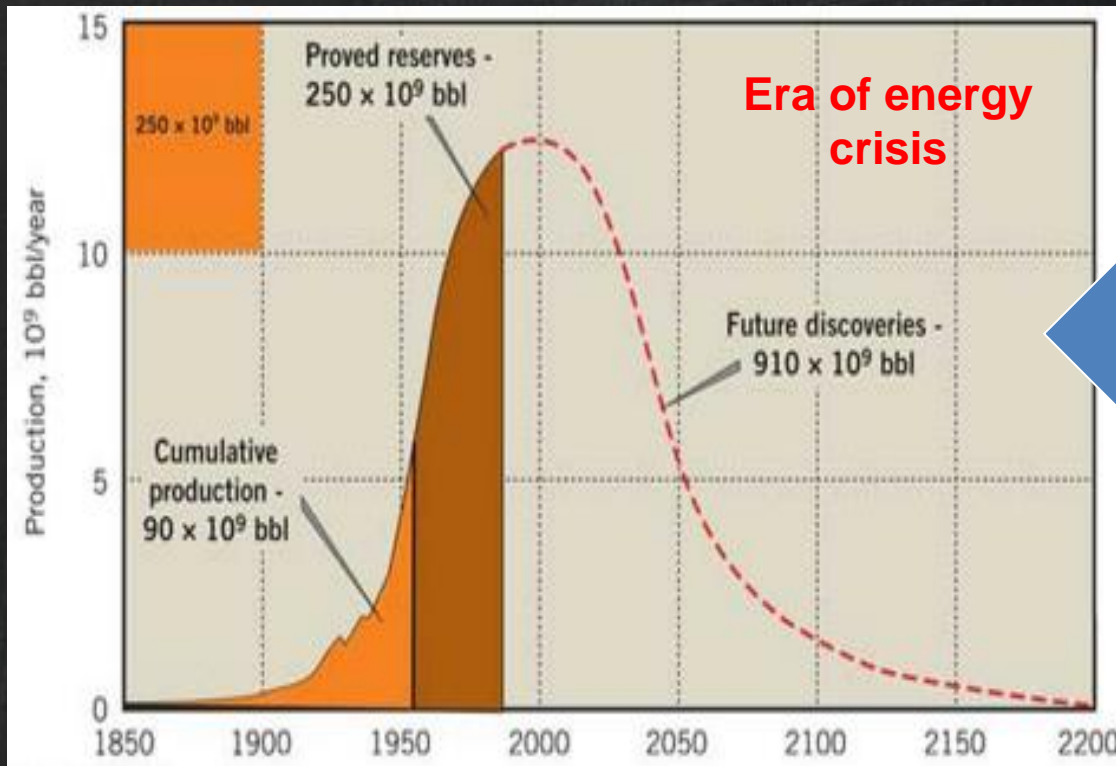
The Coming Oil Crisis?

“..the peak of production will soon be passed – possibly within three years.”

– David White, Chief Geologist, USGS, 1919



M. King Hubbert's Peak Oil Forecast or "Hubberts Curve"



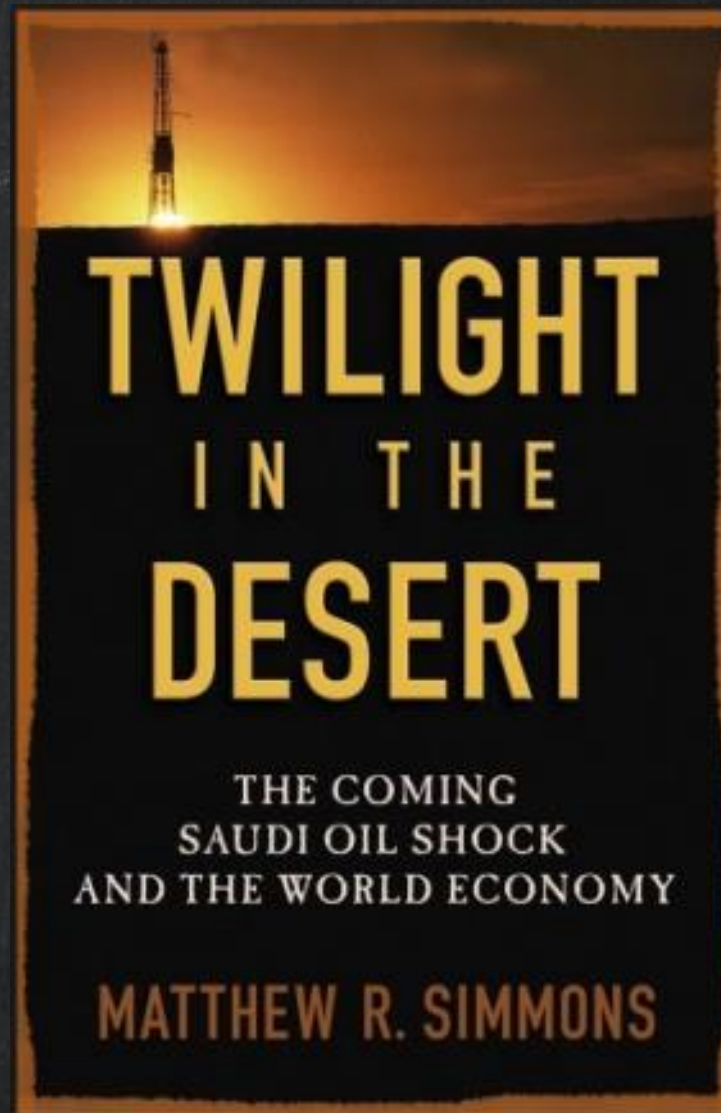
1956 Prediction

<http://www.ogj.com/1/vol-109/issue-45/drilling-production/world-peak-oil-production-full.html>



Hubbert (1903-1989)

en.wikipedia.org/wiki/Image:Hubbert.jpg



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The Essence of Oil & Gas Depletion

*Collected Papers and Excerpts
Compiled by*

C. J. Campbell

Hubbert's Peak

The Impending World Oil Shortage

KENNETH S. DEFFEYES

FAREWELL FOSSIL FUELS

Reviewing America's
Energy Policy

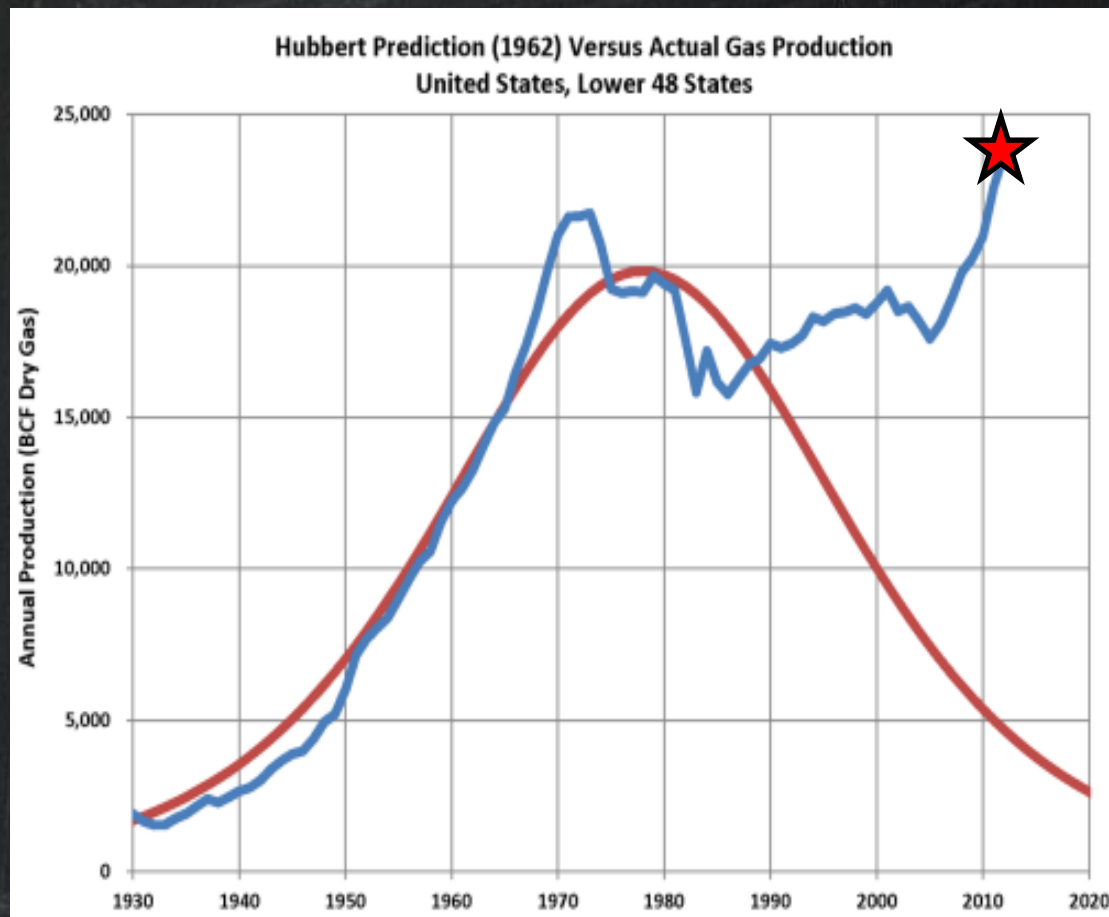
SIDNEY BOROWITZ

DAVID GOODSTEIN

Out of Gas

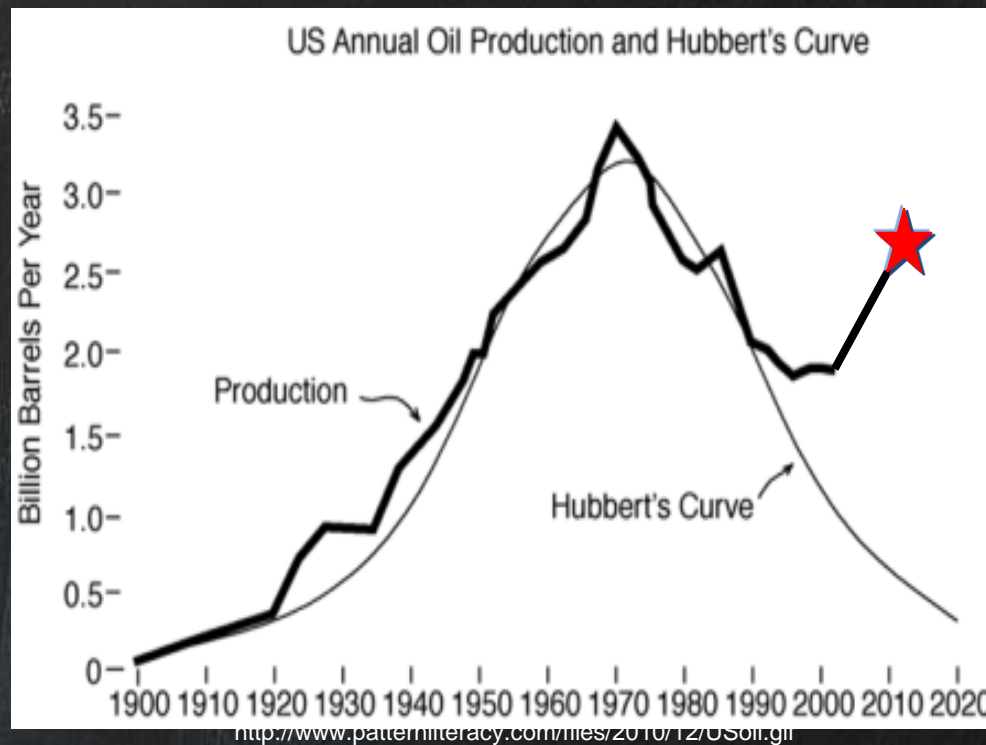
The
End
of the
Age of Oil

U.S. Gas Production at Record Highs



2012
24 TCF/yr
(55 year supply)

Hubbert's Predicted U.S. Oil Production Peak Versus Actuals



★ Estimated 2013 Production, EIA
44 year `supply

Black Swan Events

- “The Black Swan: The Impact of the Highly Improbable” Nassim N. Taleb (2007)
- Definition
 - Surprising
 - High-impact
 - Psychological biases
 - Retrospective predictability

The Unconventional Resource Play: A Black Swan

- Surprising
- High-impact
- Psychological biases
- Retrospective predictability





Oil is first found ...
in the mind.

Pratt's Blinders to Oil-Finding

- Conservatism of trained scientific mind
- Ignore significance of what remains unknown

“however small our knowledge may be, tends often, not only to color, but actually to obscure what remains unknown to us”

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of the
**AMERICAN ASSOCIATION OF
PETROLEUM GEOLOGISTS**

DECEMBER, 1952

TOWARD A PHILOSOPHY OF OIL-FINDING¹

WALLACE E. PRATT²
Carlsbad, New Mexico

John Masters

“Part of the definition of a new idea is that it will be rejected at first. Evolution teaches us that most new ideas don’t work, so we learn to be against them. Big ideas do not come from groups or committees. Throughout history they have come from individuals and ‘normal’ people almost never recognize the importance of the idea until much later on.”

- Oil and Gas Investor, July 1, 2008



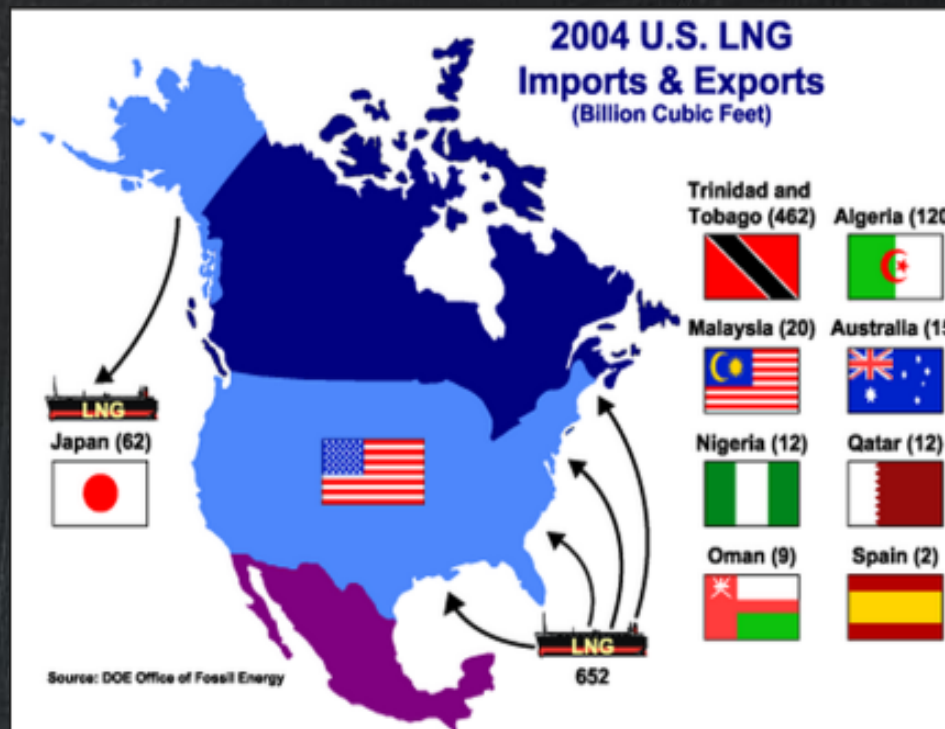
Pratt's Black Swan - Saudi Arabia

- “No Oil in Arabia”
- World's largest oil reserves
- Oil and gas seeps known for hundreds of years



Max Steineke – Creator of Ghawar Prospect

Natural Gas Imports & Exports, 2004 (BCF)



Measuring the Impact of Tight Oil

- 65% imported oil 5 years ago
- 45% imported oil today
- 20% less imported oil = \$125 Billion/Year
- 25% imported oil by 2020 ? 0% ?



Mike Johnson creator of Parshall (Bakken) Prospect

Measuring the Impact of Shale Gas

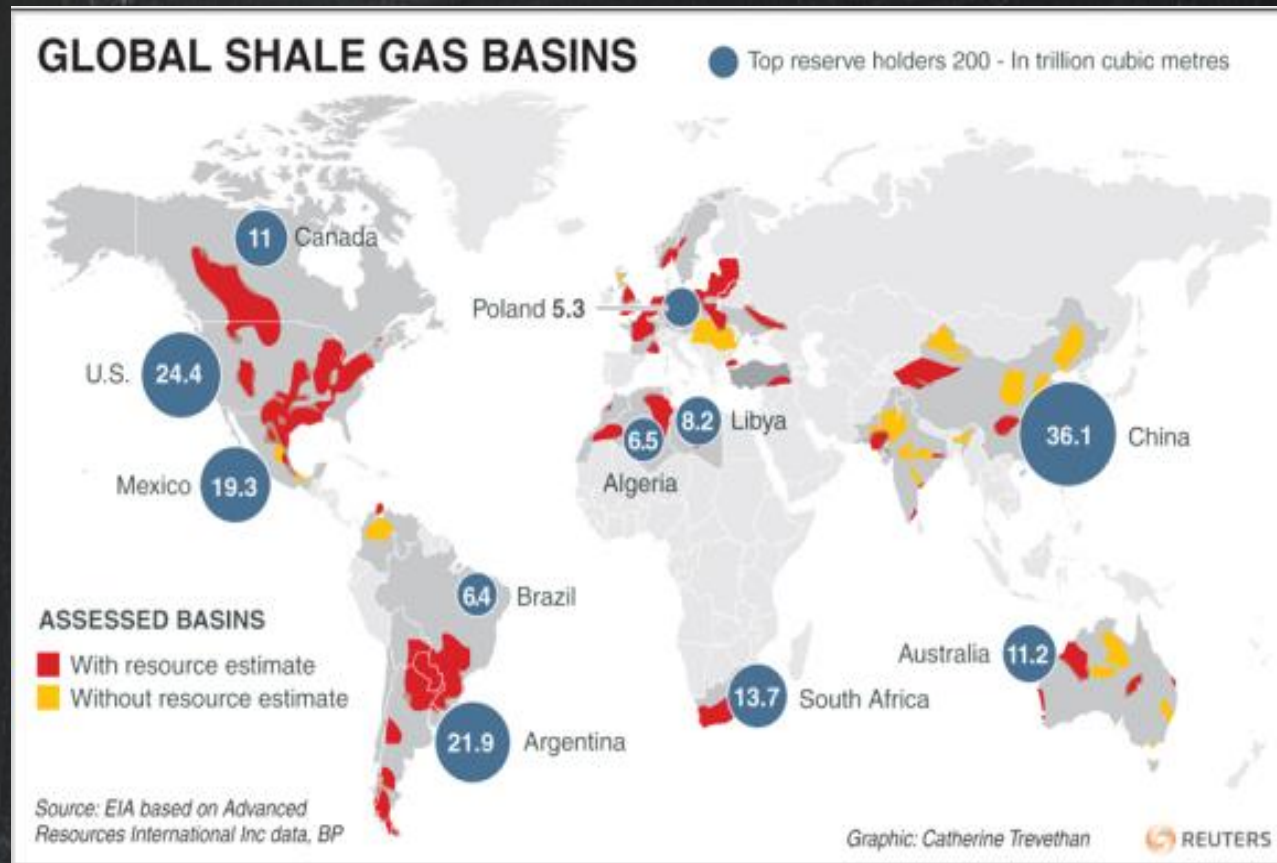
- 1.7 to 2.8 million new jobs
- \$380 billion/year to US economy
- Industries returning to US



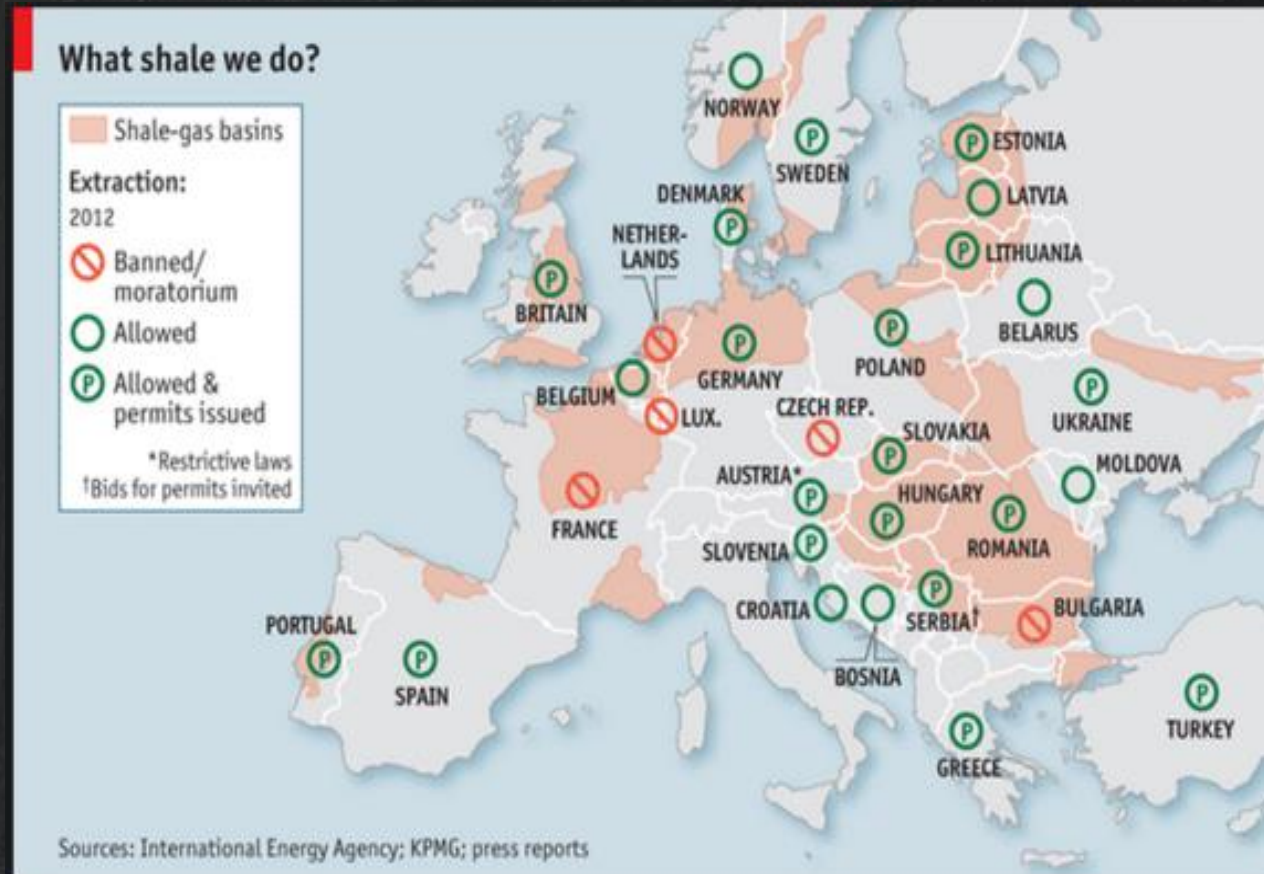
Source: IHS and ExxonMobil

Dan Steward creator of the Barnett Shale gas play

Global Shale Gas



Shale Gas Politics



Parke Dickey

- "We usually find oil in new places with old ideas. Sometimes, also, we find oil in an old place with a new idea, but we seldom find much oil in a old place with an old idea. Several times in the past we have thought we were running out of oil whereas actually we were only running out of ideas."
- Parke A. Dickey, 1958



“Invitado de Honor”
IV Simposio Bolivariano. 1991

Plaque Commemorating Founding of AAPG in 1917

