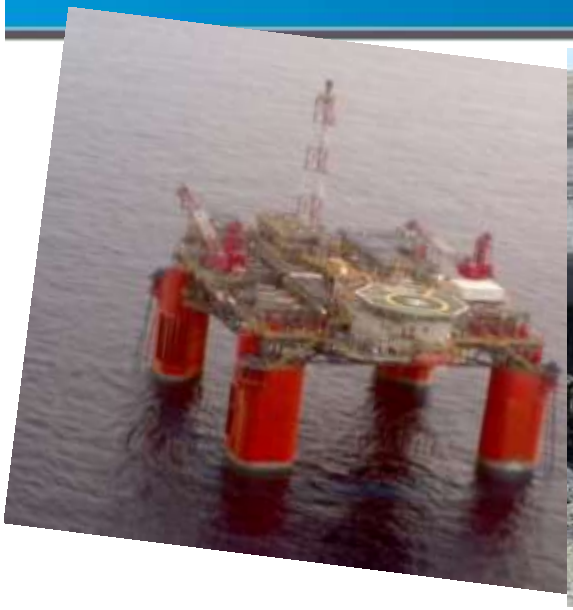


Can the U.S. Dominate Energy?

September 7, 2017
AADE/IADC, Houston Tx.

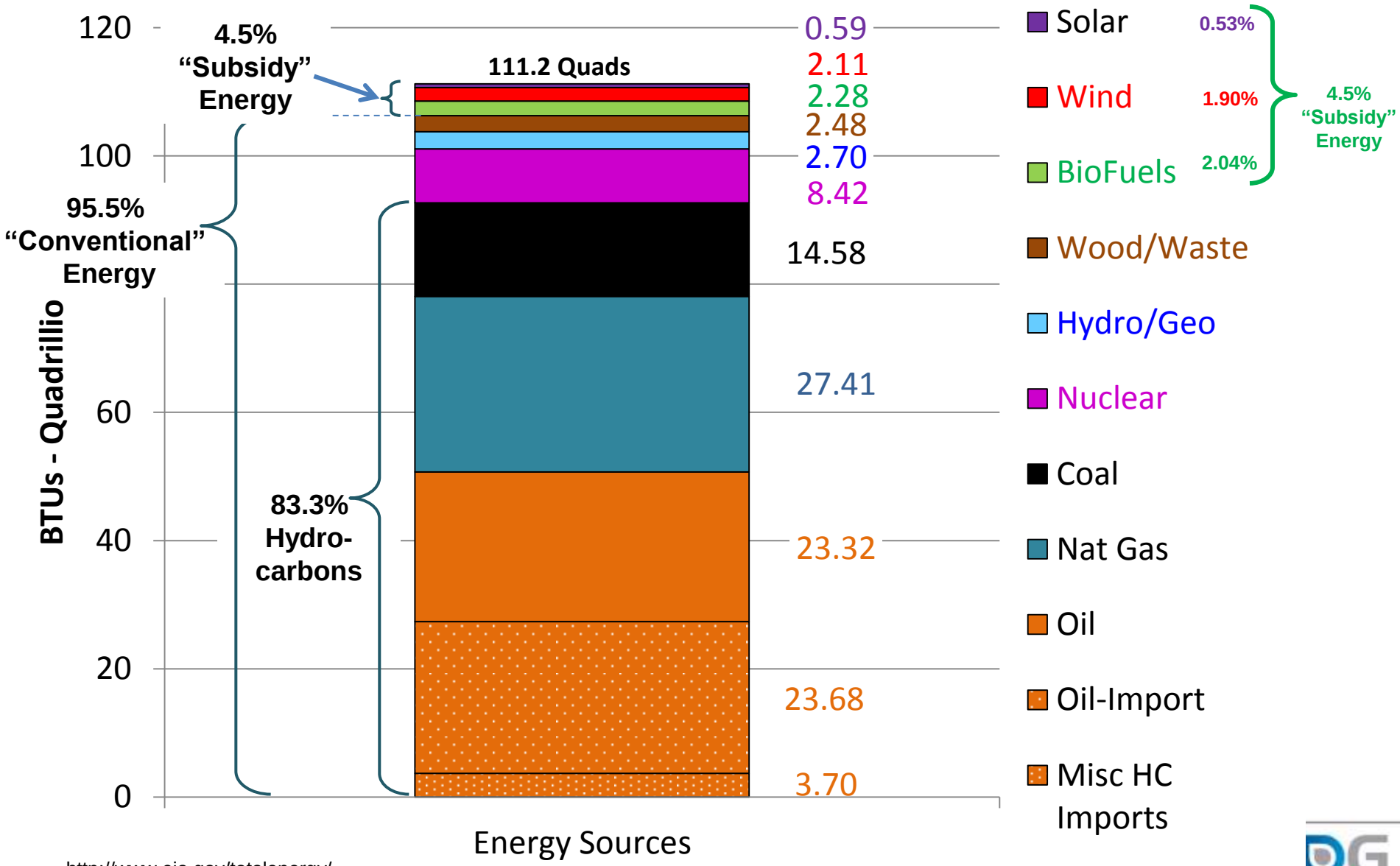
J.M. Leimkuhler
Vice President Drilling
LLOG Exploration L.L.C.



Can the US Dominate Energy?

- US Energy Overview – Where do we get our energy, where does energy go?
- Review the Trump Administration's Energy Goals & Strategy – what does it mean to "DOMINATE" energy?
- SWOT Analysis – Strengths, Weaknesses, Opportunities & Threats - America's ability to "DOMINATE" energy.
- Answer the question, Can the US dominate Energy?
  - In Depth Look at each sector: Oil, Gas, Coal, Nuclear, & "Renewables" (Hydro/Geo, Bio-Fuels, Wind, Solar)

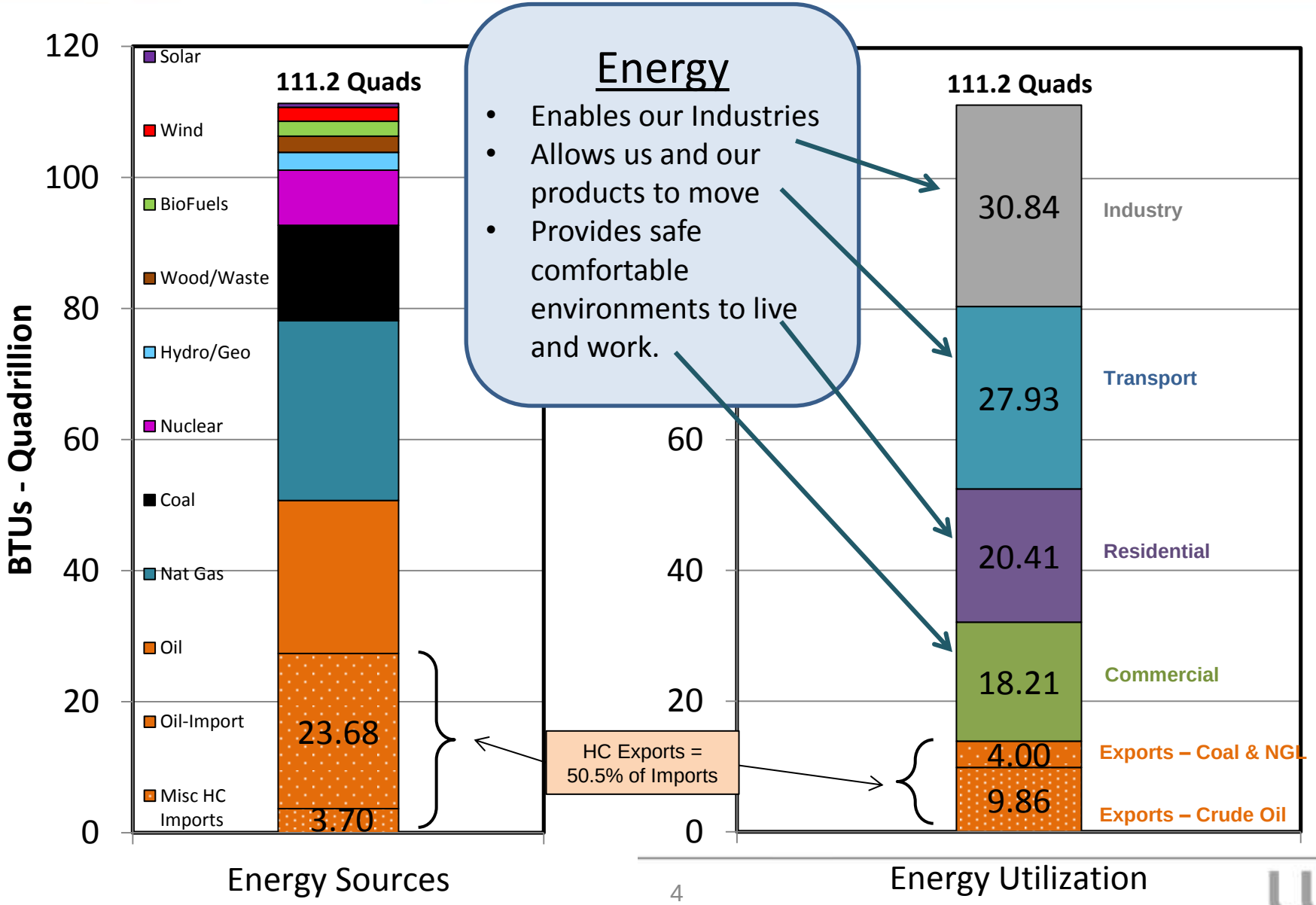
USA 2016 – Energy Flow - Sources



http://www.eia.gov/totalenergy/

DG exploration

USA 2016 – Energy Flow – Sources & Utilization



http://www.eia.gov/totalenergy/

Can the US Dominate Energy?

- US Energy Overview – Where do we get our energy, where does energy go?
- Review the Trump Administrations Energy Goals & Strategy – to date & what does it mean to "DOMINATE" energy?
- SWOT Analysis – Strengths, Weaknesses, Opportunities & Threats Analysis - an Overview of America's ability to "DOMINATE" energy.
- Answer the question, Can the US dominate Energy?
  - Look at each sector: Oil, Gas, Coal, Oil, Nuclear, Hydro/Geo, Bio-Fuels, Wind, Solar

Trump Vision of American Energy Dominance

"We're here today to usher in a new American energy policy,…. not only focusing on "energy independence," but also "energy dominance." 6/29/17 Whitehouse.GOV

Focus Areas:

- First, we will begin to ***revive and expand our nuclear energy sector***…A complete review of U.S. nuclear energy policy will help us find new ways to revitalize this crucial energy resource.
- Second, the Department of the Treasury will address financing barriers for efficient overseas coal plants. Goal – ***increase US Coal Exports***.
- Third, approved construction of a new petroleum pipeline to Mexico, which will further ***boost American Energy Exports***. US crude has qualities attractive to the international market.
- Fourth, ***globally market American natural gas***. DOE approved additional applications to export LNG from Louisiana.

Finally, in order to unlock more energy from the 94 percent of offshore land closed to development under the previous administration, we ***are creating a new offshore Oil and Gas Leasing program***. America will be allowed to access the vast energy wealth located right off our shores."

"Our country will no longer be vulnerable to foreign regimes that use energy as an economic weapon; American families will have access to cheaper energy, allowing them to keep more of their hard-earned dollars; and our workers will have access to more jobs and opportunities."

6/29/17 Whitehouse.GOV

Trump Admin Vision of American Energy Dominance

Trump Cabinet secretaries — Rick Perry -Energy, , Scott Pruitt – EPA, & Ryan Zinke - Interior:

- "Dominance" means being a "self-reliant and secure nation, free from the geopolitical turmoil of other nations that seek to use energy as an economic weapon."
- "An energy-dominant America will export to markets around the world, increasing our global leadership and influence,"
- "For the first time in four decades, the energy story in the United States is about becoming an energy exporter and no longer about peak resources or being beholden to foreign powers,"
- "For years, Washington stood in the way of our energy dominance," ……. "That changes now."

Washington Post 6/29/17

Using the Trump Administration definition/understanding of Dominance, the US will dominate in energy sectors where we can achieve two objectives:

(1) Meet all of our domestic demand/needs.

(2) Export to markets around the world at a level where we can "influence the market" .

- In the 1980's, and 1990's ….OPEC dominated oil on a global basis.
  - Australia and Indonesia currently Dominate Coal
  - Australia & Qatar Dominates Natural Gas (LNG)
    - Where can America "Dominate"?

LLOG exploration

Can the US Dominate Energy?

- US Energy Overview – Where do we get our energy, where does energy go?
- Review the Trump Administrations Energy Goals & Strategy – to date & what does it mean to "DOMINATE" energy?
- SWOT Analysis – Strengths, Weaknesses, Opportunities & Threats Analysis - an Overview of America's ability to "DOMINATE" energy.
- Answer the question, Can the US dominate Energy?
  - Look at each sector: Oil, Gas, Coal, Oil, Nuclear, Hydro/Geo, Bio-Fuels, Wind, Solar

American Energy Dominance SWOT Review

Strengths

- Strong resource positions in hydrocarbons, Coal, Gas, Oil.
- World Class Technology in resource extraction – Onshore & Offshore.
- Entrepreneurial society – responds relatively quickly to market forces able to quickly uptake new technology.
- Largest Energy consuming Economy in the world .
- Strongest existing energy distribution network in the world, energy transport, & energy refining.
- Access to the worlds financial resources & markets.
- Mature , generally effective regulatory environment.

Weaknesses

- Existing & Prior Federal policy focused on higher cost less reliable energy production , while discouraging low cost reliable HC based energy production.
- Regulatory environment historically underestimates costs and over estimates benefits….especially relative to "renewable energy.
- Energy commodity markets are not primarily driven by market forces. Too much instability generated by computerized commodity trading ca ~80%

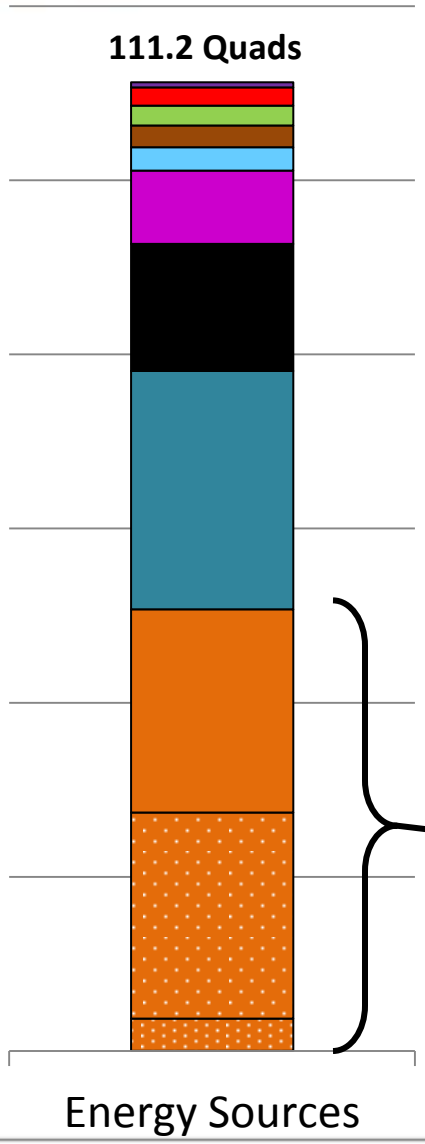
Opportunities

- Efficiency gains – the worlds largest energy consuming economy also has the greatest potential to increase efficiency……for the right reason.
- Fully understanding our energy resources…we do not live in a physical world of scarcity. Do we even "know what we don't know?"
- How would our foreign policy and the cost of that policy change if we were fully energy independent? Upside far exceeds the downside.

Threats

- US society is relatively technologically illiterate, ….and the trend is in the wrong direction….can the public understand and support an energy policy that considers all the +/- of each energy source…..esp nuclear & HC based energy?
- Regulatory Environment under increasing political influence….both ways.
- Cost trends may make US energy non-competitive. – we are not the low cost producer in oil, & nuclear.
- Coastal states have or are likely to enact policies discouraging export of American HC based energy.

America's Energy Resources & Dominance



- Solar
- Wind
- BioFuels
- Wood/Waste
- Hydro/Geo
- Nuclear
- Coal
- Nat Gas
- Oil
- Oil-Import
- Misc HC Imports

Can America Dominate Oil?

Do we meet our current domestic demand?

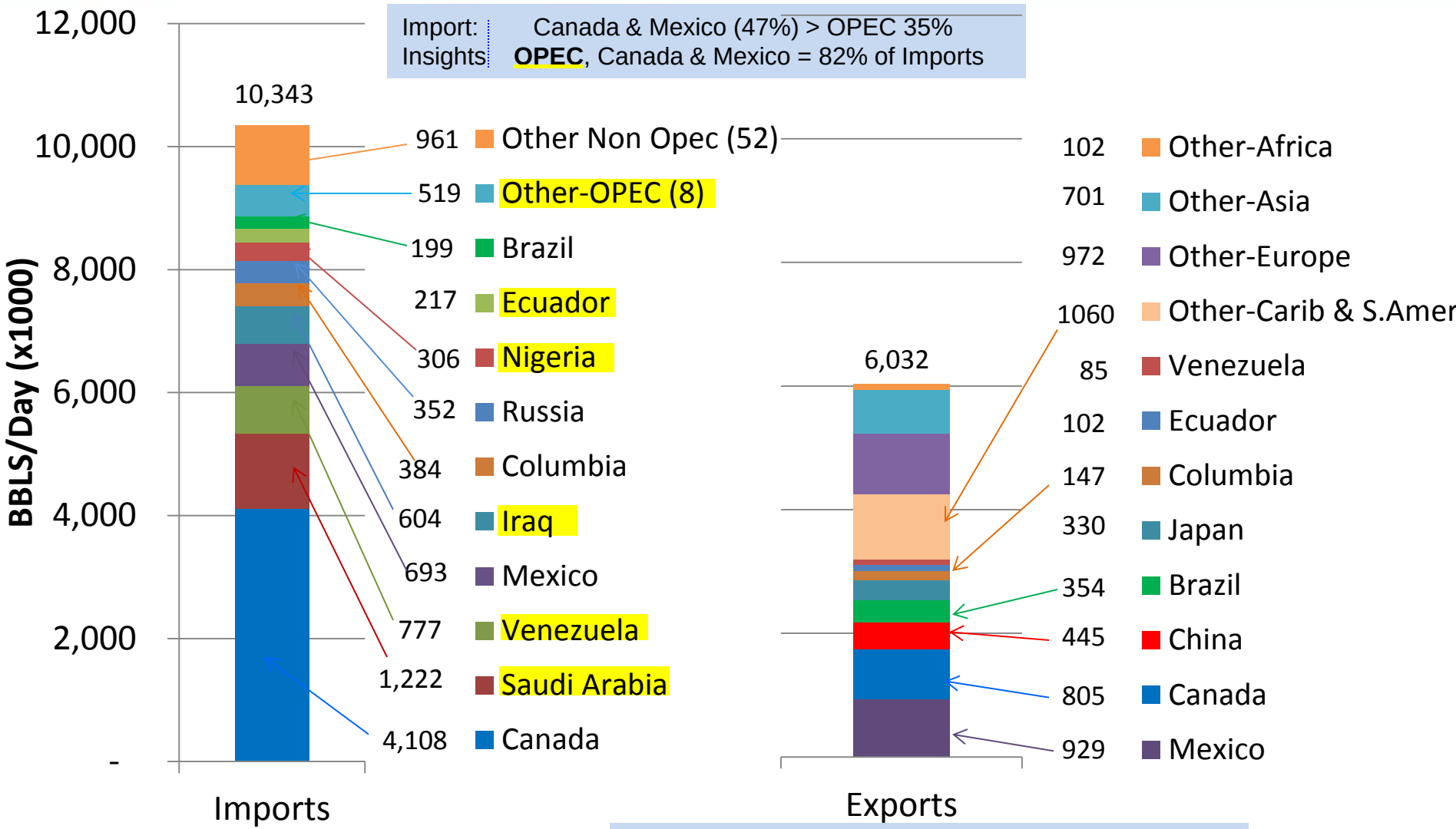
Do we have the reserves to dominate?

How much excess capacity do we have to generate exports?

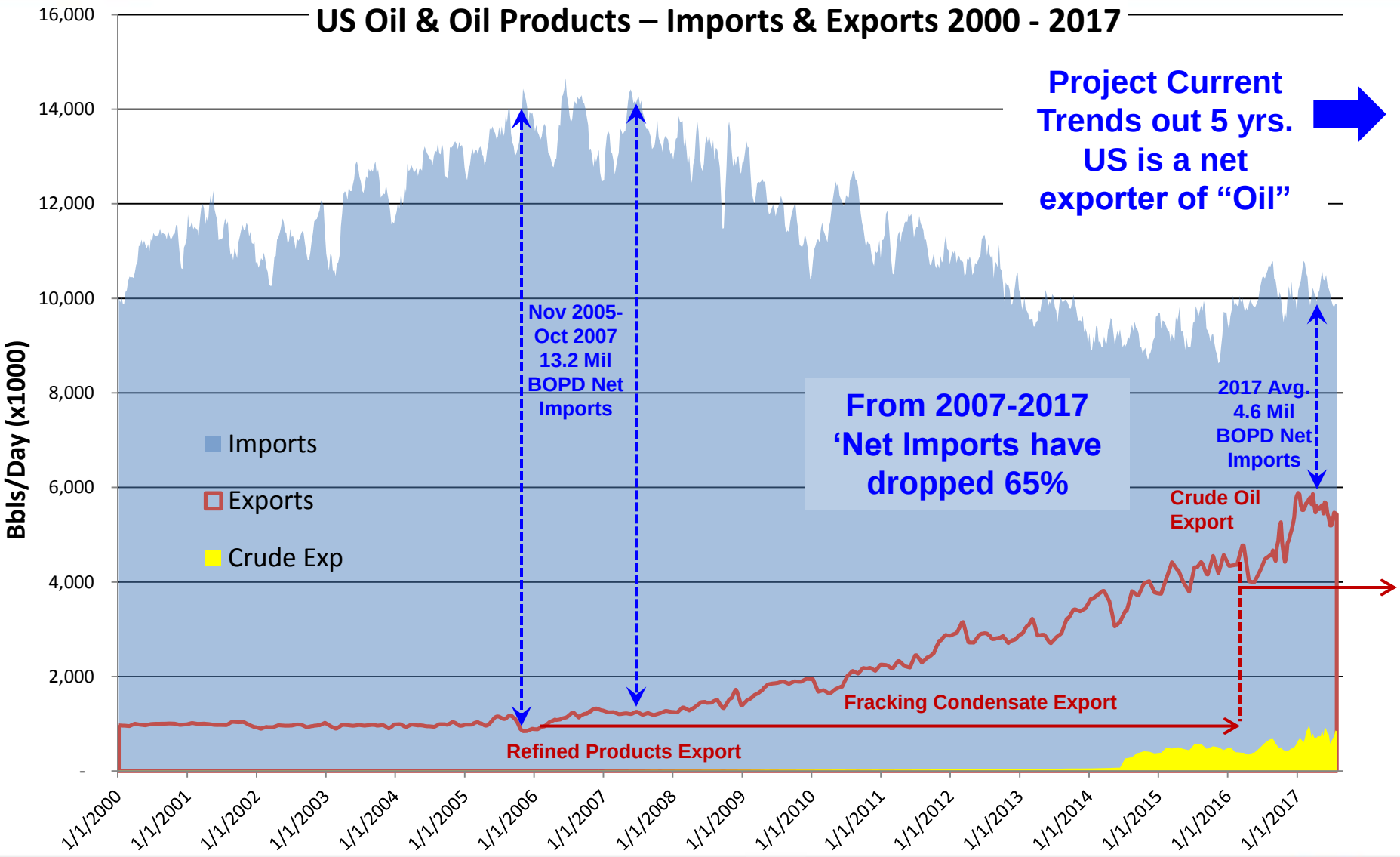
Do we have the mechanisms and policies to enable exports?

LLOG exploration

From whom do we Import "Oil" and who takes our Exports?



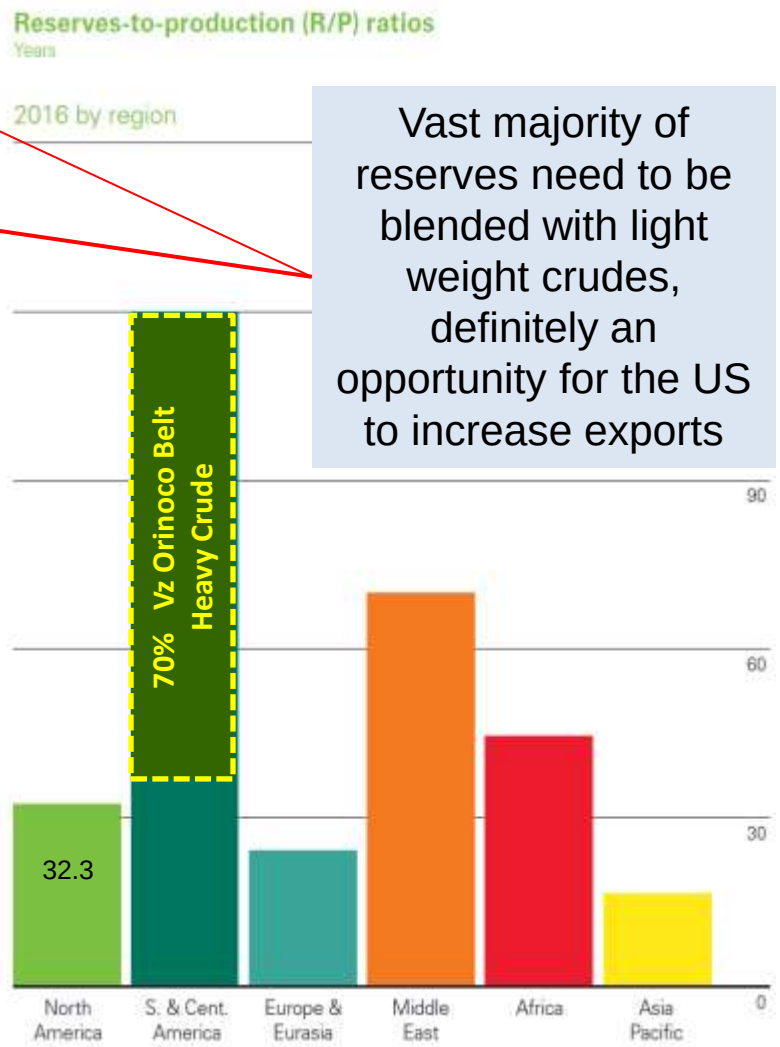
Can the US Meet Domestic "Oil" Demand?



Where are the World's Proven Oil Reserves

Source: BP Statistical Review of World Energy 2017

Country - Region	Bln Bbls Proved Reserves				Share %	R/P
	1996	2006	2015	2016		
Venezuela	72.7	87.3	300.9	300.9	17.6%	341.1
Saudi Arabia	261.4	264.3	266.6	266.5	15.6%	59.0
Canada	48.9	179.4	171.5	171.5	10.0%	105.1
Iran	92.6	138.4	158.4	158.4	9.3%	94.1
Iraq	112.0	115.0	142.5	153.0	9.0%	93.6
Russia	113.6	104.0	102.4	109.5	6.4%	26.6
Kuwait	96.5	101.5	101.5	101.5	5.9%	88.0
United A.E	97.8	97.8	97.8	97.8	5.7%	65.6
Libya	29.5	41.5	48.4	48.4	2.8%	310.1
USA	29.8	29.4	48.0	48.0	2.8%	10.6
Nigeria	20.8	37.2	37.1	37.1	2.2%	49.3
Kazakhstan	5.3	9.0	30.0	30.0	1.8%	49.0
China	16.4	20.2	25.7	25.7	1.5%	17.5
Qatar	3.7	27.4	25.2	25.2	1.5%	36.3
Brazil	6.7	12.2	13.0	12.6	0.7%	13.3
Algeria	10.8	12.3	12.2	12.2	0.7%	21.1
Angola	3.7	9.0	11.8	11.6	0.7%	17.5
Mexico	48.5	12.8	8.0	8.0	0.5%	8.9
Ecuador	3.5	4.5	8.0	8.0	0.5%	40.1
Norway	11.7	8.5	8.0	7.6	0.4%	10.4
Other(34)	62.9	77.0	74.6	73.3	4.0%	28.1
Total World	1148.8	1388.3	1691.5	1706.7	100.00%	50.6

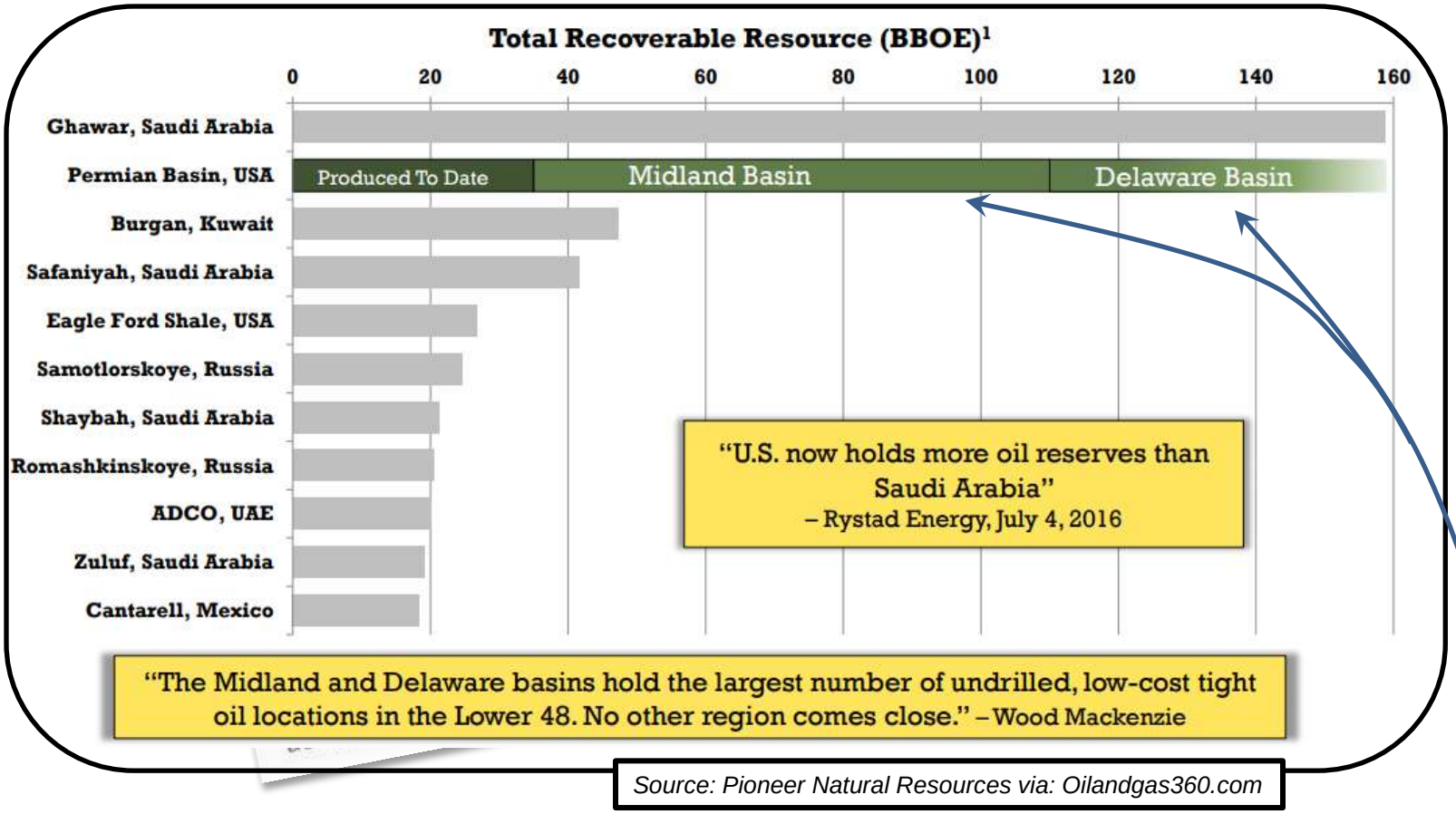


Vast majority of reserves need to be blended with light weight crudes, definitely an opportunity for the US to increase exports

Low R/P for a country that aspires to dominate Long term.

LLOG exploration

Do the latest Global Oil & Gas reserves fully account for the "Fracking" revolution?



Source: Pioneer Natural Resources via: Oilandgas360.com

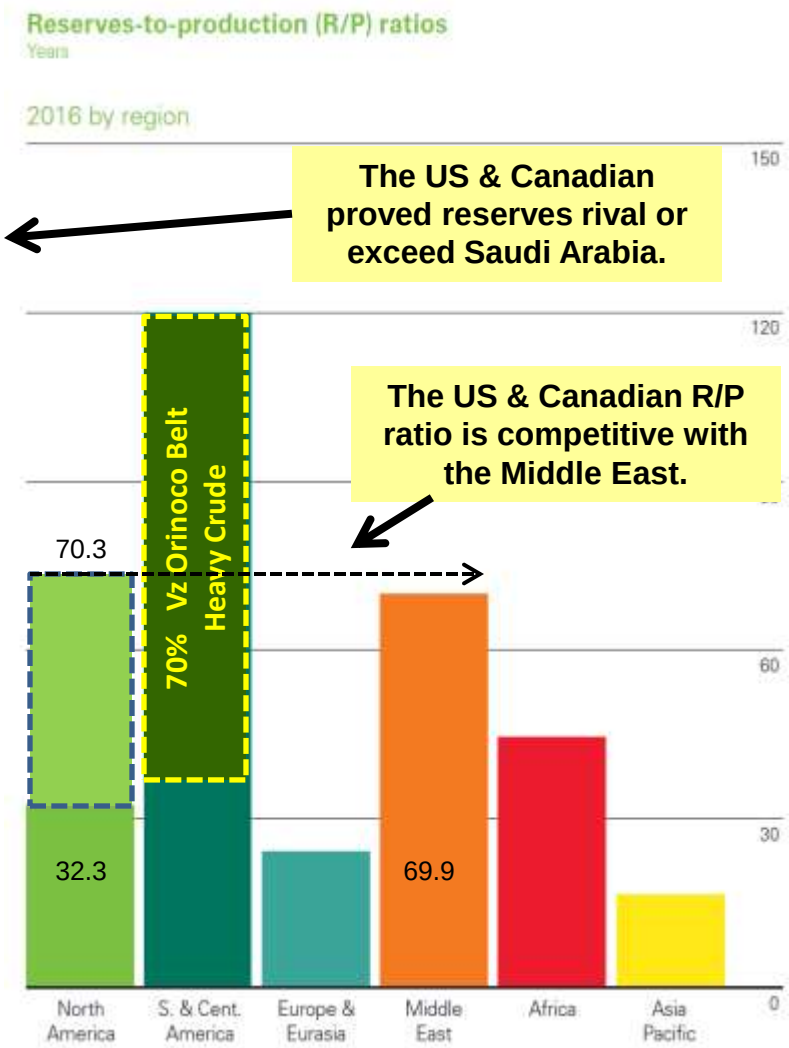
- Ans: No. What is the impact if the Pioneer Permian Basin reserve est is correct? The USA gains 135 Bln BOE in reserves.

LLOG exploration

What if US "Permian Shale Oil" = Ghawar

Source: BP Statistical Review of World Energy 2017

Country - Region	Bln Bbls Proved Reserves				Share %	R/P
	1996	2006	2015	2016		
Venezuela	72.7	87.3	300.9	300.9	16.3%	341.1
Saudi Arabia	261.4	264.3	266.6	266.5	14.5%	59.0
USA	29.8	29.4	48.0	183.0	9.9%	40.4
Canada	48.9	179.4	171.5	171.5	9.3%	105.1
Iran	92.6	138.4	158.4	158.4	8.6%	94.1
Iraq	112.0	115.0	142.5	153.0	8.3%	93.6
Russia	113.6	104.0	102.4	109.5	5.9%	26.6
Kuwait	96.5	101.5	101.5	101.5	5.5%	88.0
United A.E	97.8	97.8	97.8	97.8	5.3%	65.6
Libya	29.5	41.5	48.4	48.4	2.6%	310.1
Nigeria	20.8	37.2	37.1	37.1	2.0%	49.3
Kazakhstan	5.3	9.0	30.0	30.0	1.6%	49.0
China	16.4	20.2	25.7	25.7	1.4%	17.5
Qatar	3.7	27.4	25.2	25.2	1.4%	36.3
Brazil	6.7	12.2	13.0	12.6	0.7%	13.3
Algeria	10.8	12.3	12.2	12.2	0.7%	21.1
Angola	3.7	9.0	11.8	11.6	0.6%	17.5
Mexico	48.5	12.8	8.0	8.0	0.4%	8.9
Ecuador	3.5	4.5	8.0	8.0	0.4%	40.1
Norway	11.7	8.5	8.0	7.6	0.4%	10.4
Other(34)	62.9	77.0	74.6	73.3	4.0%	28.1
Total World	1,149	1,388	1,692	1,842	100.0%	50.6



The US Shale Oil and Gas Resource / Reserves Question

In terms of Oil resources the US is a lot like Venezuela – we have the resources.

But do we really have the reserves?

Resources ≠ Reserves

Resource is what is physically there,

Reserves are the portion of the Resource that can be economically produced.

Resources are only the first step to dominance, in the end Reserves are what really matter.

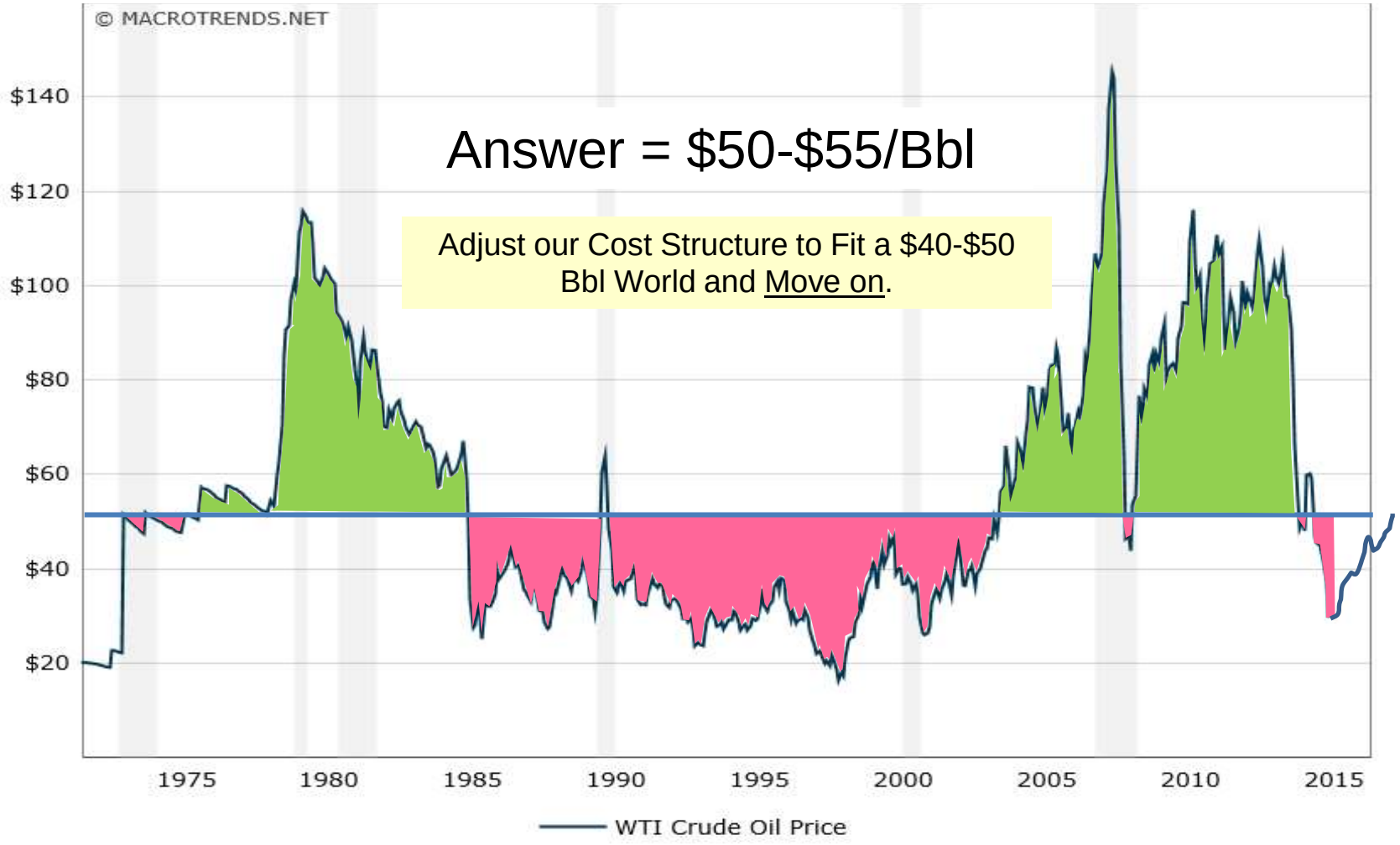
Does the US only have “Big” reserves intermittently in high price environments?

Or, can US Shale Oil compete at lower prices…… and how low, is low?

1st Question - What is the "Reserve Basis" Oil Price?

The "Average Joe" Oil Price

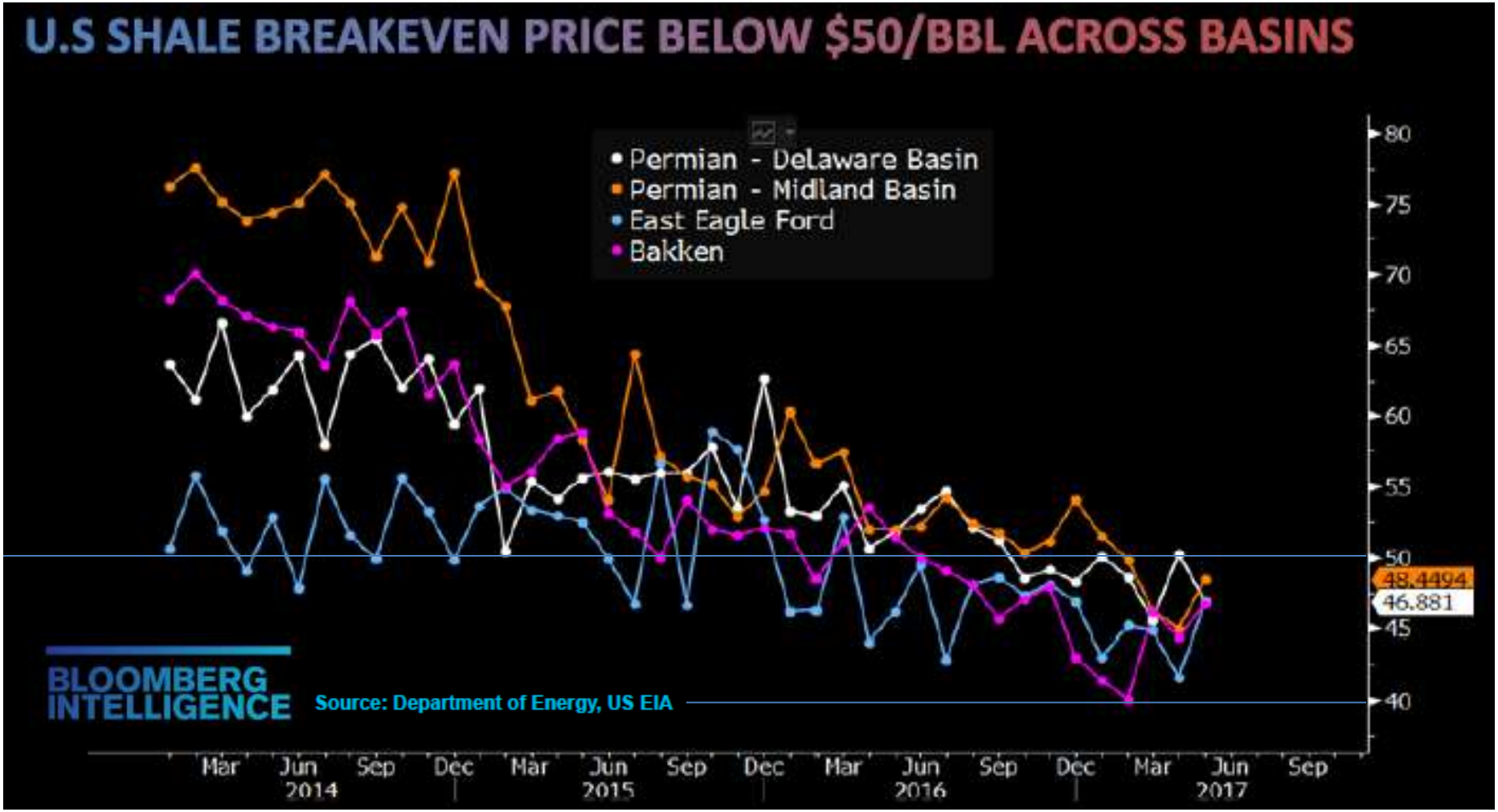
Inflation Adjusted Average Oil Price over the last 40 yrs =?



Answer = $50-$55/Bbl

Adjust our Cost Structure to Fit a $40-$50 Bbl World and Move on.

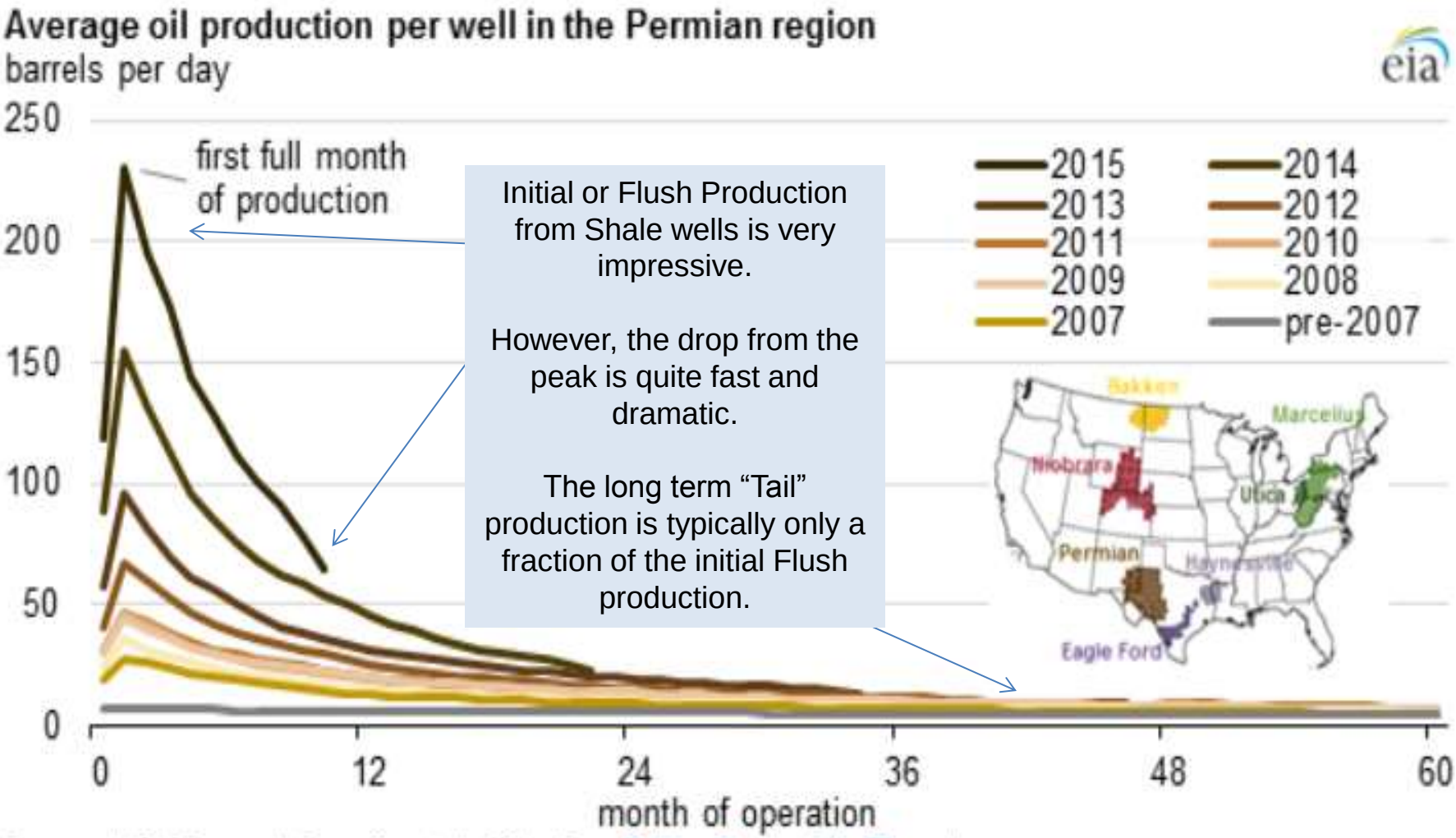
Can the US Oil Shale Play Complete @ $40-$50/Bbls



ANSWER - Yes, we can.

LLOG exploration

Shale Oil – Production Trends The Flush & The Tail



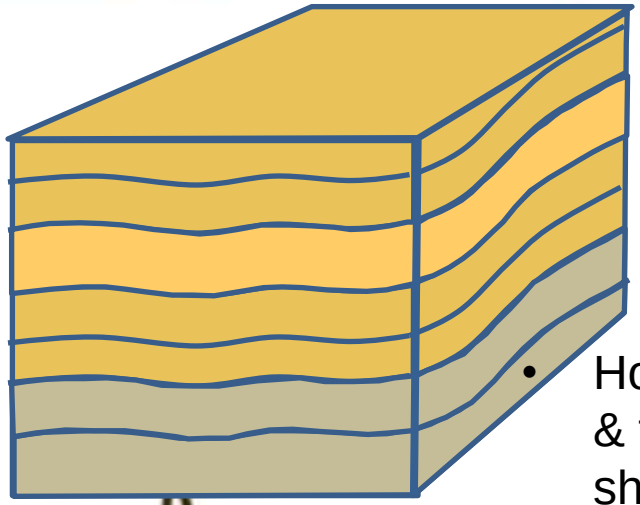
Initial or Flush Production from Shale wells is very impressive.

However, the drop from the peak is quite fast and dramatic.

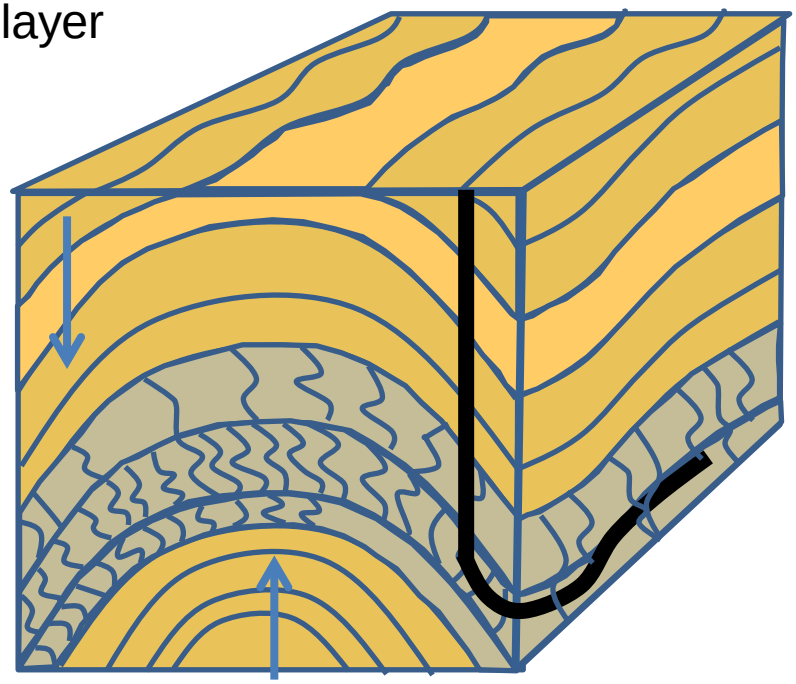
The long term "Tail" production is typically only a fraction of the initial Flush production.

LLOG exploration

Fracking CW – Why The Flush Production – Then Decline?

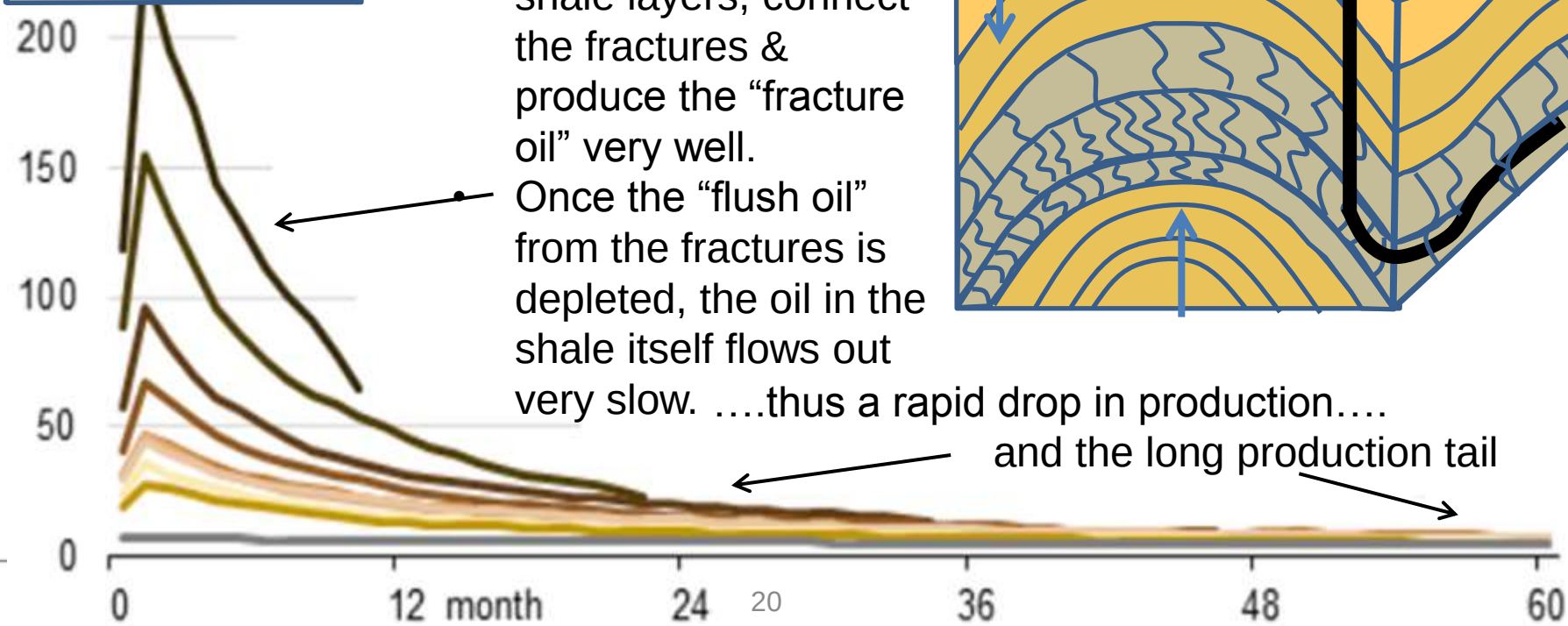


- In Oil Shale deposits the rock has a low permeability.
- Over millions of years the rock is stressed & cracks.
- Oil seeps into cracks, but the oil has not migrated out of the shale rock layer

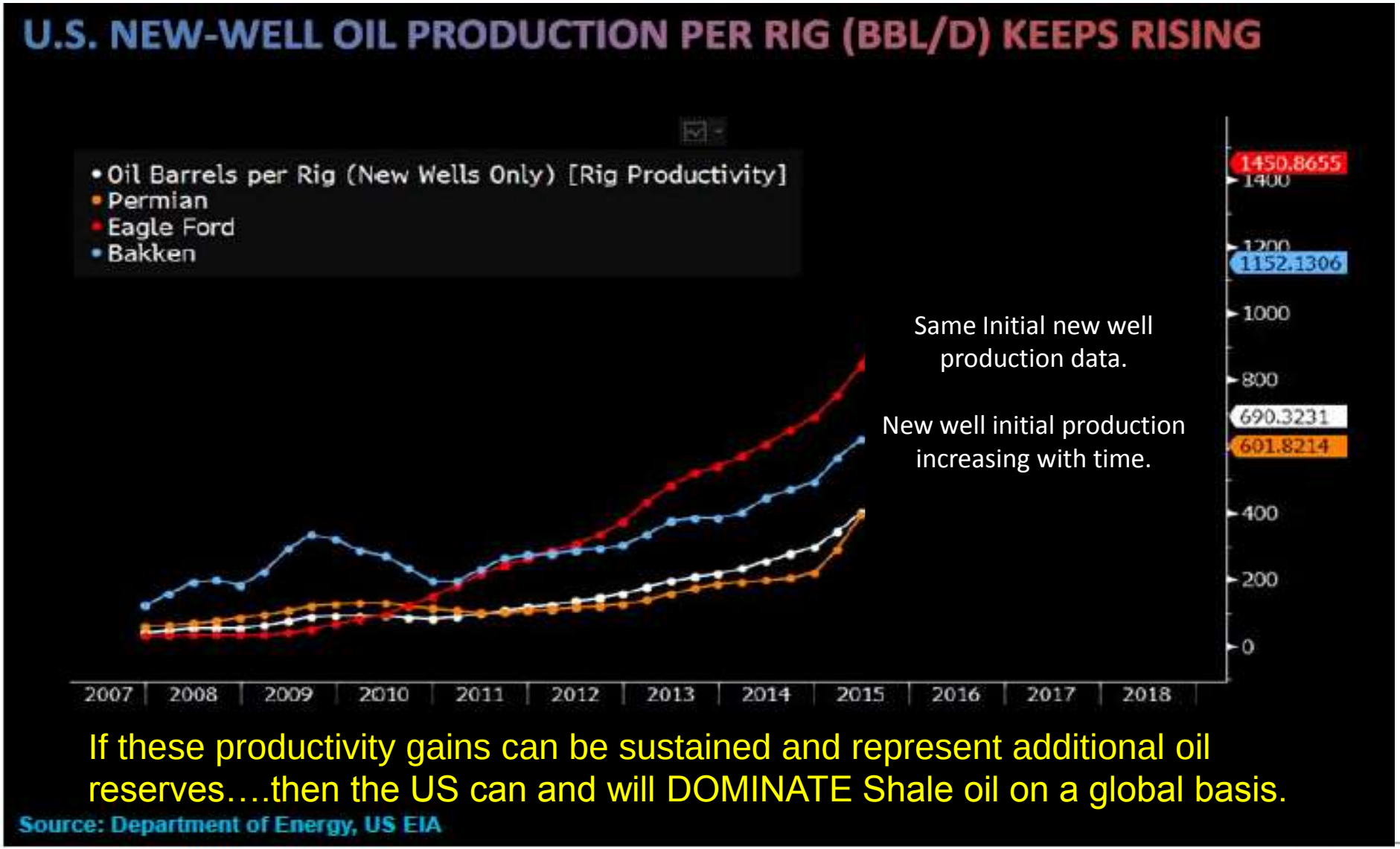


- Horizontal wells drilled & fracked along the shale layers, connect the fractures & produce the “fracture oil” very well.
- Once the “flush oil” from the fractures is depleted, the oil in the shale itself flows out very slow. ….thus a rapid drop in production….

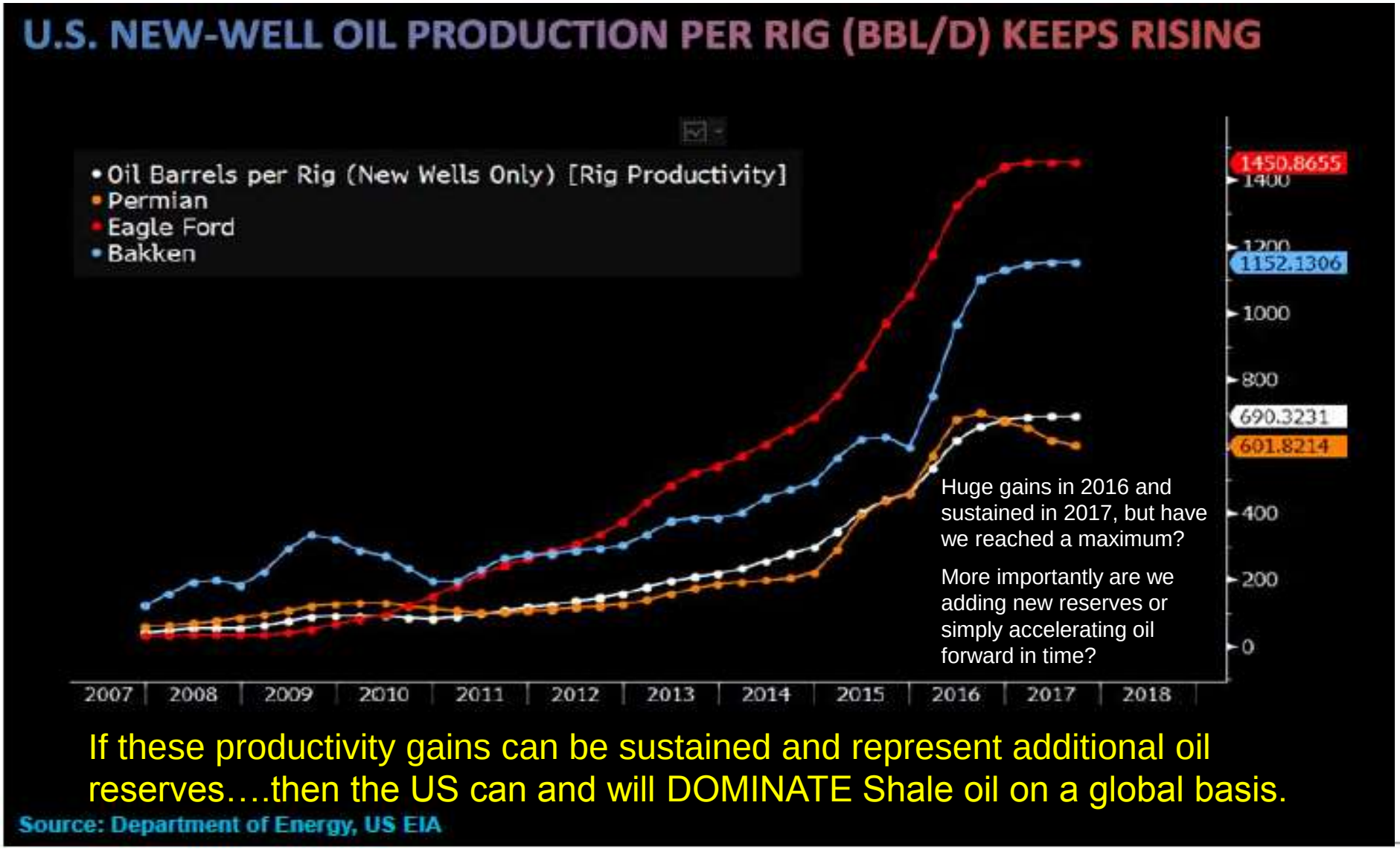
and the long production tail



So what is the real return on an Oil Shale Well…is there a real and significant production tail?

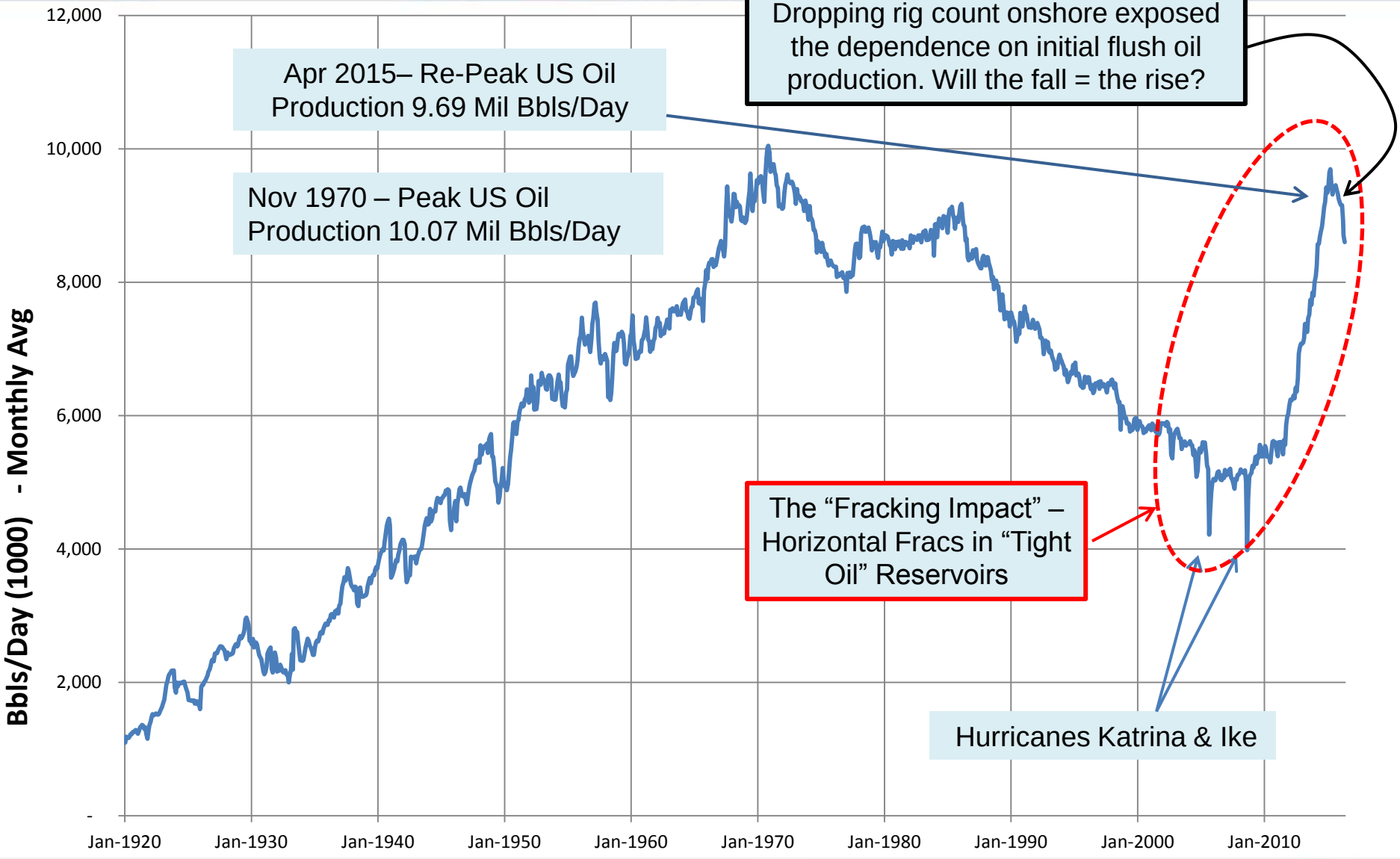


So what is the real return on an Oil Shale Well…is there a real and significant production tail?



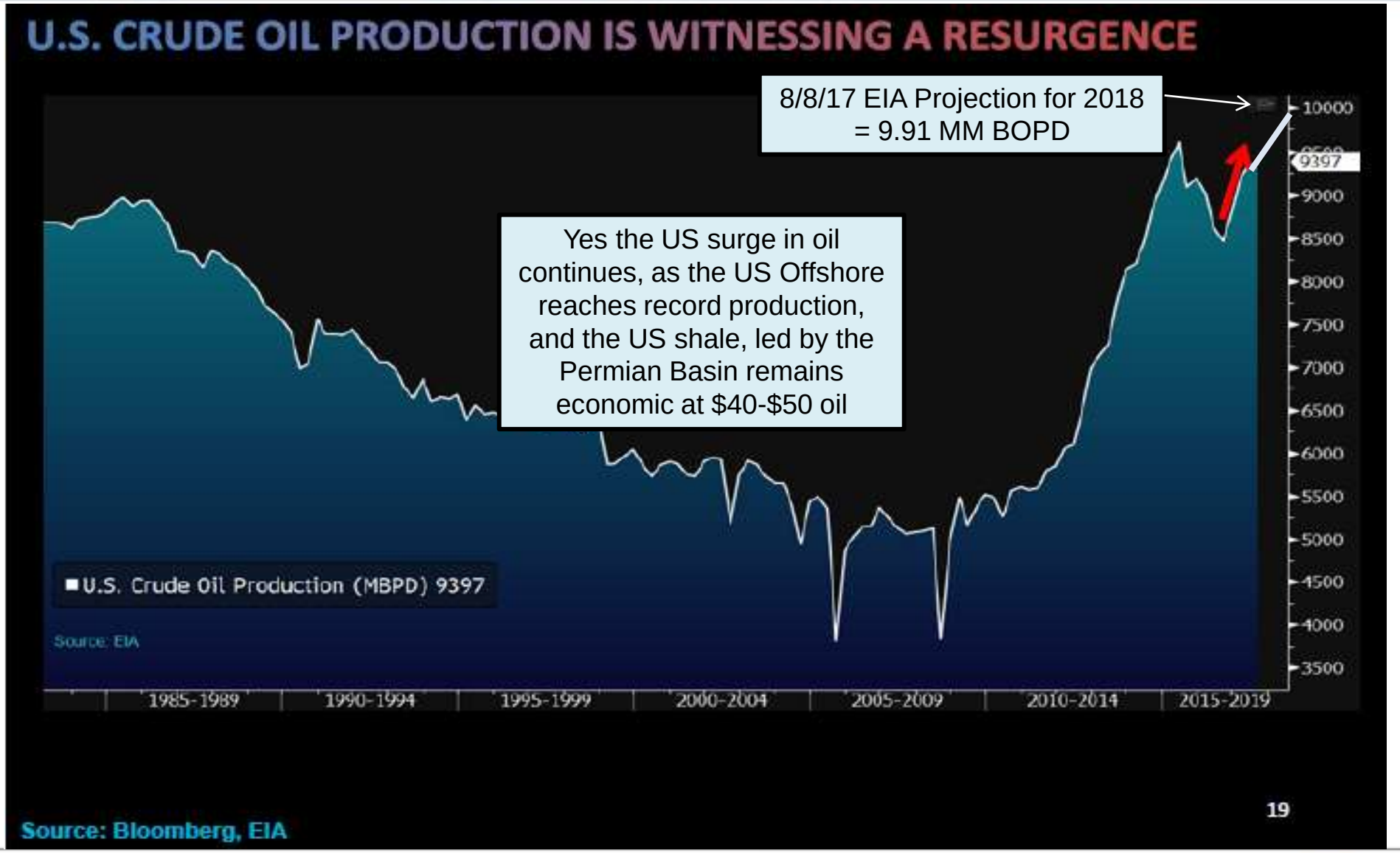
US Oil Production Trends 1920 - 2017

Can the US Oil resurgence continue in $40-$50 oil?



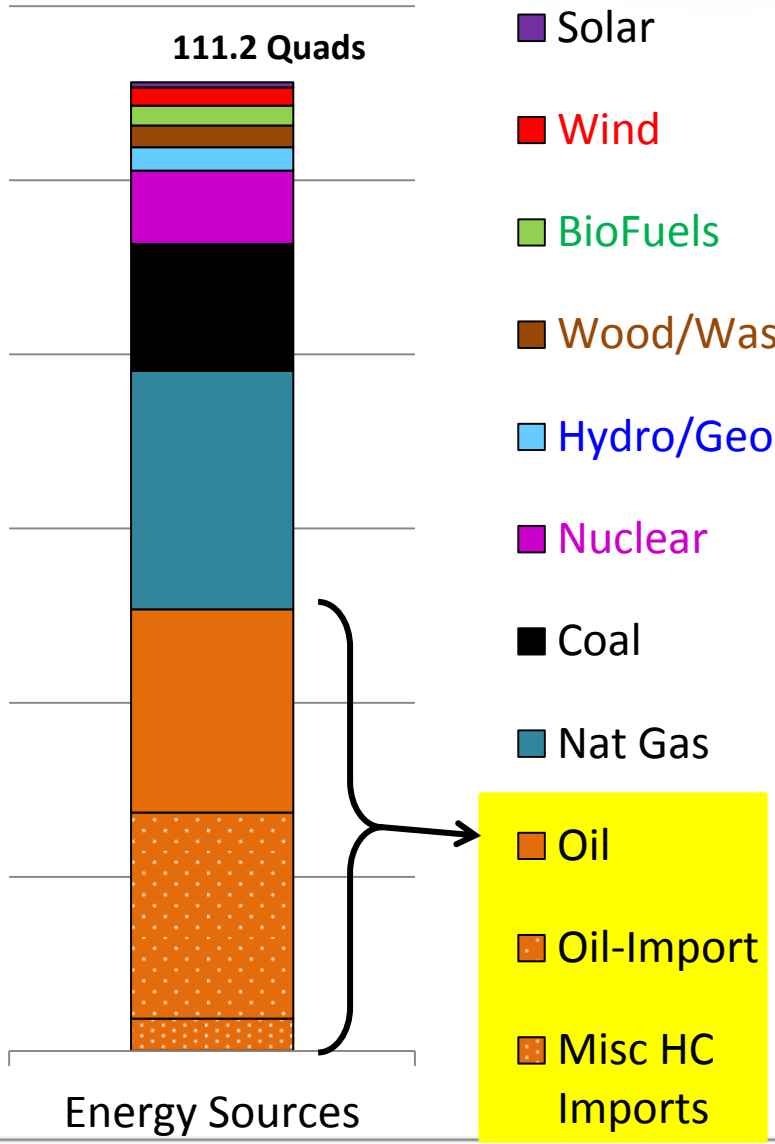
LLOG exploration

US Oil Production Trends 1920 - 2017



How well do we understand the “Tight OIL & Gas” Play?

America's Energy Resources & Dominance



Can America Dominate Oil?

YES

Do we meet our current domestic demand?

Not yet, but we are on course to be a net exporter in ~5 yrs

Do we have the reserves to dominate?

Yes if we can sustain our record offshore production and grow on shore oil @ $40-$50 /bbl oil.

How much excess capacity do we have to generate exports?

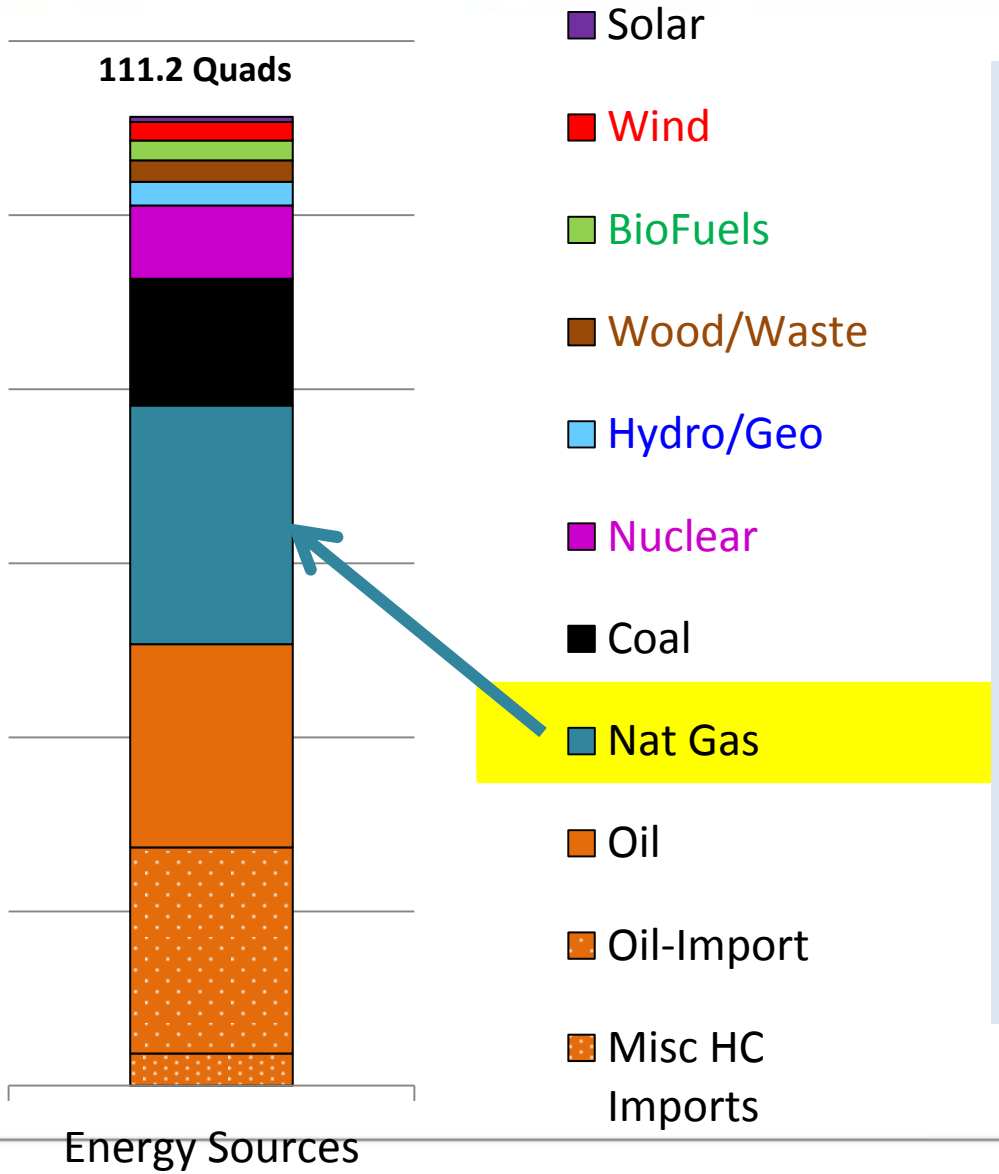
Under some scenarios equal to any nation.

Do we have the mechanisms and policies to enable exports?

Yes, Obama Admin removal of the crude oil export ban is a big enabler of American exports.

LLOG exploration

America's Natural Gas Resource & Dominance



Can America Dominate Natural Gas?

Do we meet our current domestic demand?

Do we have the reserves to dominate?

How much excess capacity do we have to generate exports?

Do we have the mechanisms and policies to enable exports?

LLOG exploration

Global Production & Consumption of Natural Gas

- The US is the global leader in Natural Gas production and consumption – meeting all domestic demand.
- ~2005-2009 the US moved from preparing Gulf Coast ports to **import** LNG to **export** LNG

GLOBAL NATURAL GAS PRODUCTION

Country	BCM /Yr- Nat Gas Prod				Yr-Yr Growth	10 Yr Growth	%
	2013	2014	2015	2016			
USA	685	733	766	749	-2.5%	4.1%	21.1%
Russia	605	582	575	579	0.5%	-0.1%	16.3%
Iran	167	186	189	202	6.6%	6.4%	5.7%
Qatar	178	174	179	181	1.3%	14.6%	5.1%
Canada	141	147	149	152	1.7%	-1.3%	4.3%
China	122	132	136	138	1.4%	10.3%	3.9%
Norway	109	109	117	117	-0.7%	3.2%	3.3%
Saudi	100	102	105	109	4.4%	3.9%	3.1%
Algeria	82	83	85	91	7.6%	-0.4%	2.6%
Australia	59	64	73	91	25.2%	7.0%	2.6%
Malaysia	67	68	71	74	3.4%	1.1%	2.1%
Indonesia	77	75	75	70	-7.4%	-5.0%	2.0%
Others (<2%) 42	1,012	1,011	1,011	997			28.4%
Total	3,404	3,466	3,531	3,552	0.3%	2.4%	100.0%

Source: BP Statistical Review of World Energy 2017

Global Natural Gas Consumption - Bil Cu M

Country - Region	Yearly Consumption BCM			Growth	% Share
	2014	2015	2016	Per 10 Yr	
USA	753	773	778	2.2%	22.0%
Russia	409	402	390	0.2%	11.0%
China	188	194	210	15.0%	5.9%
Iran	183	190	200	6.4%	5.7%
Japan	118	113	111	3.7%	3.1%
Saudi	102	104	109	3.9%	3.1%
Canada	104.	102	99	0.5%	2.8%
Mexico	86	87	89	3.6%	2.5%
Germany	70	73	80	-1.6%	2.3%
United Kingdom	66	68	76	-3.3%	2.2%
UAE	65	73	76	5.8%	2.2%
Others (<2%) 49	1251	1295	1318	2.2%	36.9%
Total	3,400	3480	3542	2.30%	100.0%

- On the consumption side US growth has been fueled by low gas prices and the regulatory move against coal via the “Clean Power Plan”.
- Significant movers in natural Gas.
  - China – increases in both production and consumption.
  - Qatar – Top 5 due to LNG exports
  - UK & Germany - declines in gas use.

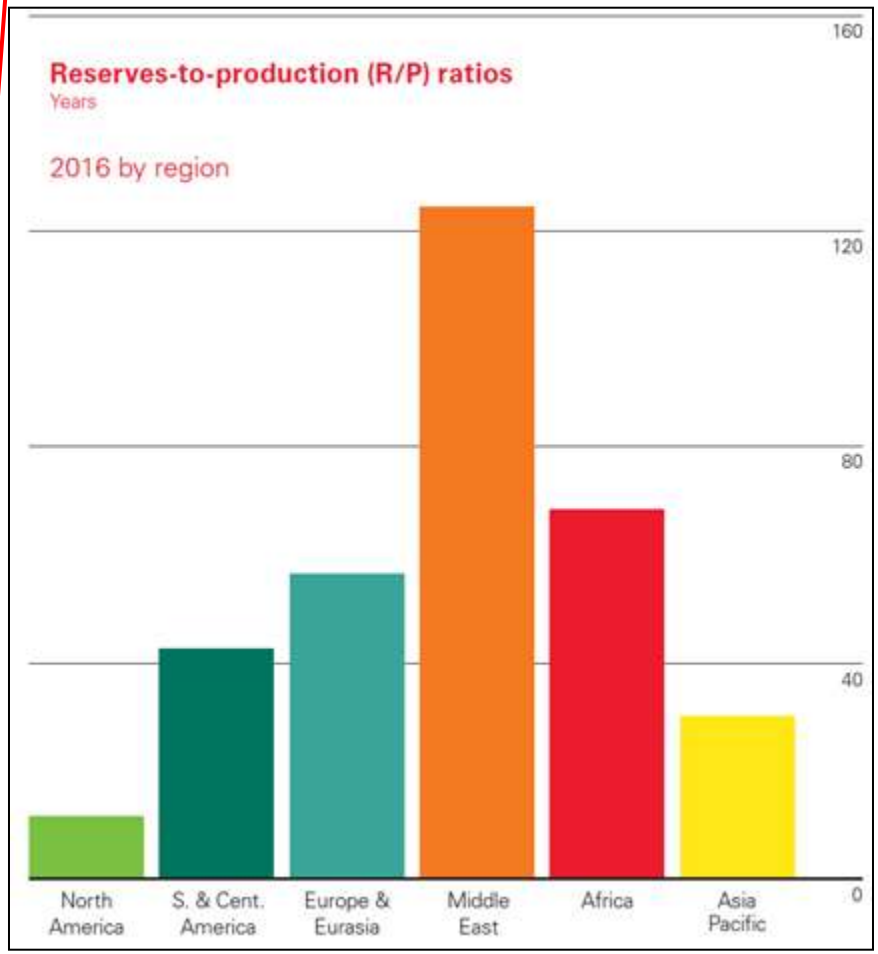
LLOG exploration

Where are the World's Proven Natural Gas Reserves?

Global Natural Gas Reserves

Country	TCF Proved Nat Gas Reserves				%	R/P
	2013	2014	2015	2016		
Iran	813	951	1,185	1,185	18.0%	166
Russia	1,093	1,103	1,142	1,142	17.3%	56
Qatar	301	902	859	859	13.0%	134
Turkmenistan	-	81	619	619	9.4%	262
USA	166	212	308	308	4.7%	12
Saudi Arabia	202	251	297	297	4.5%	77
UAE	205	226	216	216	3.3%	99
Venezuela	145	166	202	202	3.1%	166
China	42	60	170	191	2.9%	39
Nigeria	124	184	187	187	2.8%	118
Algeria	131	159	159	159	2.4%	49
Iraq	120	113	131	131	2.0%	*
Australia	46	81	124	124	1.9%	38
Indonesia	71	92	99	103	1.5%	41
Canada	67	57	78	78	1.2%	14
Other (<1%)	704	941	789	894	12.0%	
Total World	4,934	6,522	7,353	7,588	100%	52.5

The US and Canada due to a high Natural gas consumption rate have the lowest Reserves: Production ratio of major producing regions



- US Reserves have increased close to 100% from 2013 to 2015.
- No reserve increase in 2016.
- Factors driving low to no reserve additions:
  1. Low Nat gas prices and a historic low gas-rig count.
  2. The oil/gas price spread favors oil
  3. Increased productivity of the tight oil fracs, especially in the Permian basin.

Raw Data Source: BP Statistical Review of World Energy 2017

LLOG exploration

Global Natural Gas Trade – Imports & Exports

Country - Region	2015				2016			
	Pipeline Imports	LNG Imports	Pipeline Exports	LNG Exports	Pipeline Imports	LNG Imports	Pipeline Exports	LNG Exports
Qatar	–	–	20	101.8	–	–	20	104.4
Australia	6.4	–	–	38.1	8.3	0.1	–	56.8
Other Asia-Pac	20.3	46	21.4	51.4	19.3	54.8	22.7	51.1
Other Africa	9	3.7	11	30	8.8	10.2	8.5	29.6
Indonesia	–	–	9.3	20.7	–	–	8.8	21.2
Other M.E.	29.6	10.2	8.4	18.8	26.9	14.2	8.4	18.1
Algeria	–	–	26.3	16.6	–	–	37.1	15.9
Trinidad	–	–	–	16.9	–	–	–	14.3
Russian	21.8	–	179.1	14	21.7	–	190.8	14.0
Norway	†	–	109.6	5.9	†	–	109.8	6.3
Other S&C America	19.9	19.8	19.9	5.1	16.8	15.5	16.8	6.1
USA	74.4	2.6	49.1	0.7	82.5	2.5	60.3	4.4
France	31.8	6.8	–	0.6	32.3	9.7	–	1.5
Other	94.7	6.9	13.8	1.5	100.2	8.2	15	1.3
Netherlands	33.6	2.1	47.1	1.3	38	1.5	52.3	0.7
U K	29	13.1	13.4	0.3	34.1	10.5	10	0.5
Spain	15.2	13.1	0.5	1.8	15	13.2	0.6	0.2
South Korea	–	43.8	–	0.2	–	43.9	–	0.1
Canada	19.2	0.6	74.3	†	21.9	0.3	82.4	
Mexico	29.9	7.3	†	–	38.4	5.9	†	
Germany	102.3	–	32.7	–	99.3	–	19.3	
Italy	55.7	5.4	0.2	–	59.4	5.7	–	
Turkey	38.4	7.7	0.6	–	37.4	7.7	0.6	
Ukraine	17.3	–	–	–	11.1	–	–	
Other CIS	27	–	72.3	–	27.9	–	74	
China	33.6	25.8	–	–	38	34.3	–	
Japan	–	110.7	–	–	–	108.5	–	
Total	709	325.5	709	325.5	737.5	346.6	737.5	346.6

On the global stage the US plays a minor role in LNG exports.

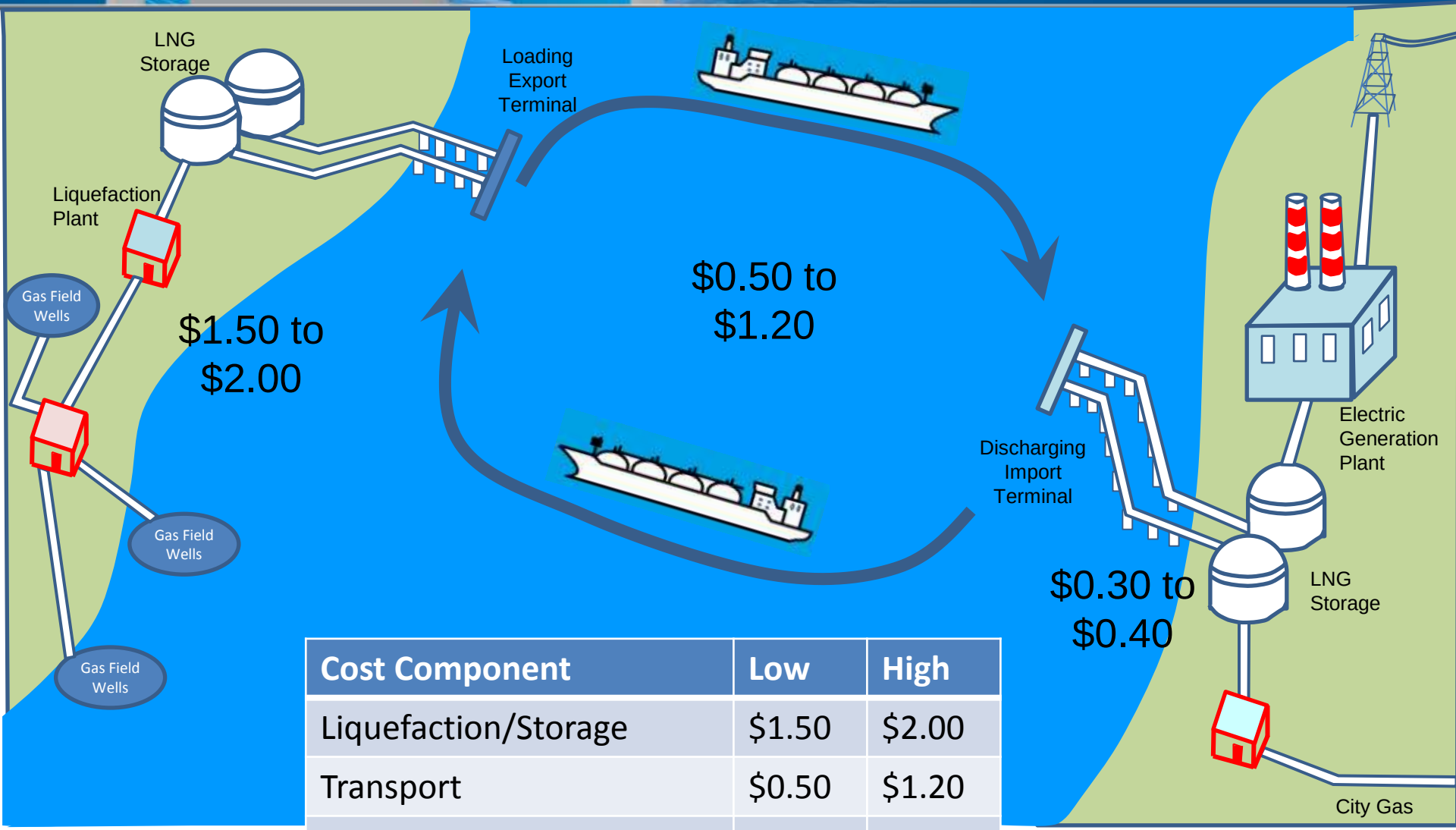
Exports would have to increase 20 fold for the US to “dominate” the global LNG markets.

To compete the US will have to increase reserves at the lowest cost, to offset the relatively high US LNG transport and handling cost.

Raw Data Source: BP Statistical Review of World Energy 2017

LLOG exploration

Natural Gas – LNG Process Cost Overview

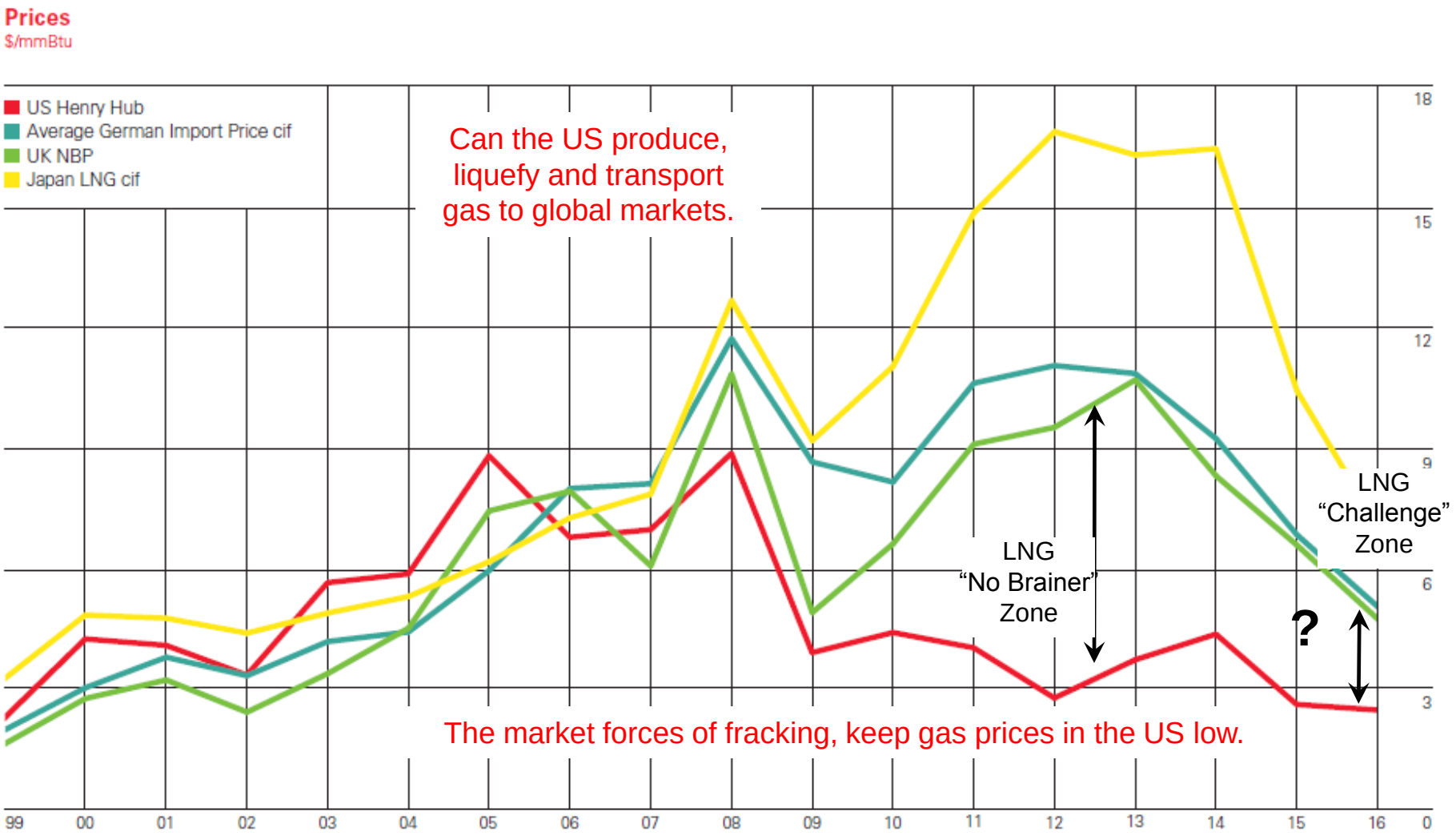


Cost Component	Low	High
Liquefaction/Storage	$1.50	$2.00
Transport	$0.50	$1.20
Unload & Storage	$0.30	$0.40
Total LNG Cycle Cost	**$2.30**	**$3.60**

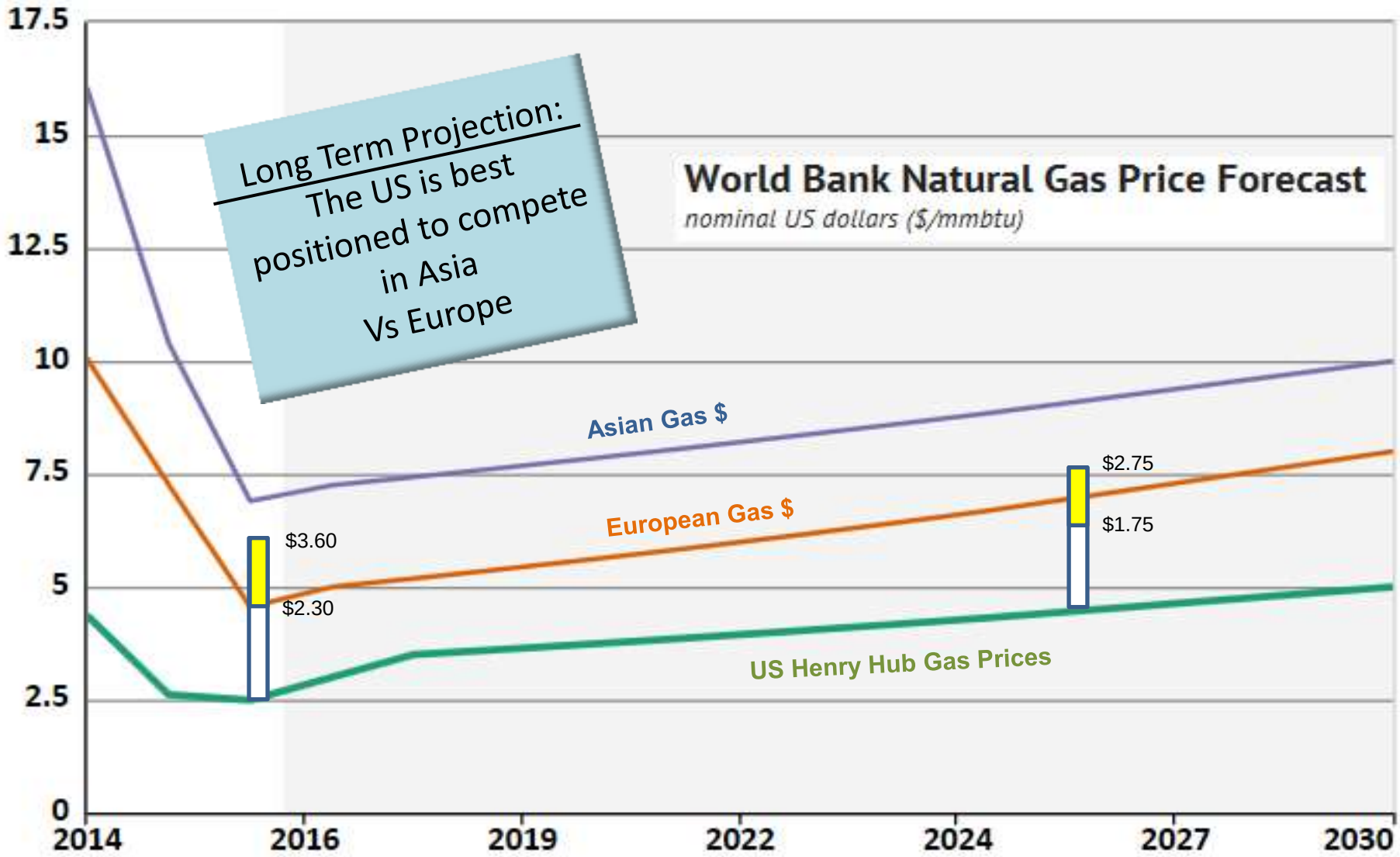
Source: Society of Petroleum Engineers - Petrowiki

LLOG exploration

Global Natural Gas Prices – The US needs to be the Global low cost producer

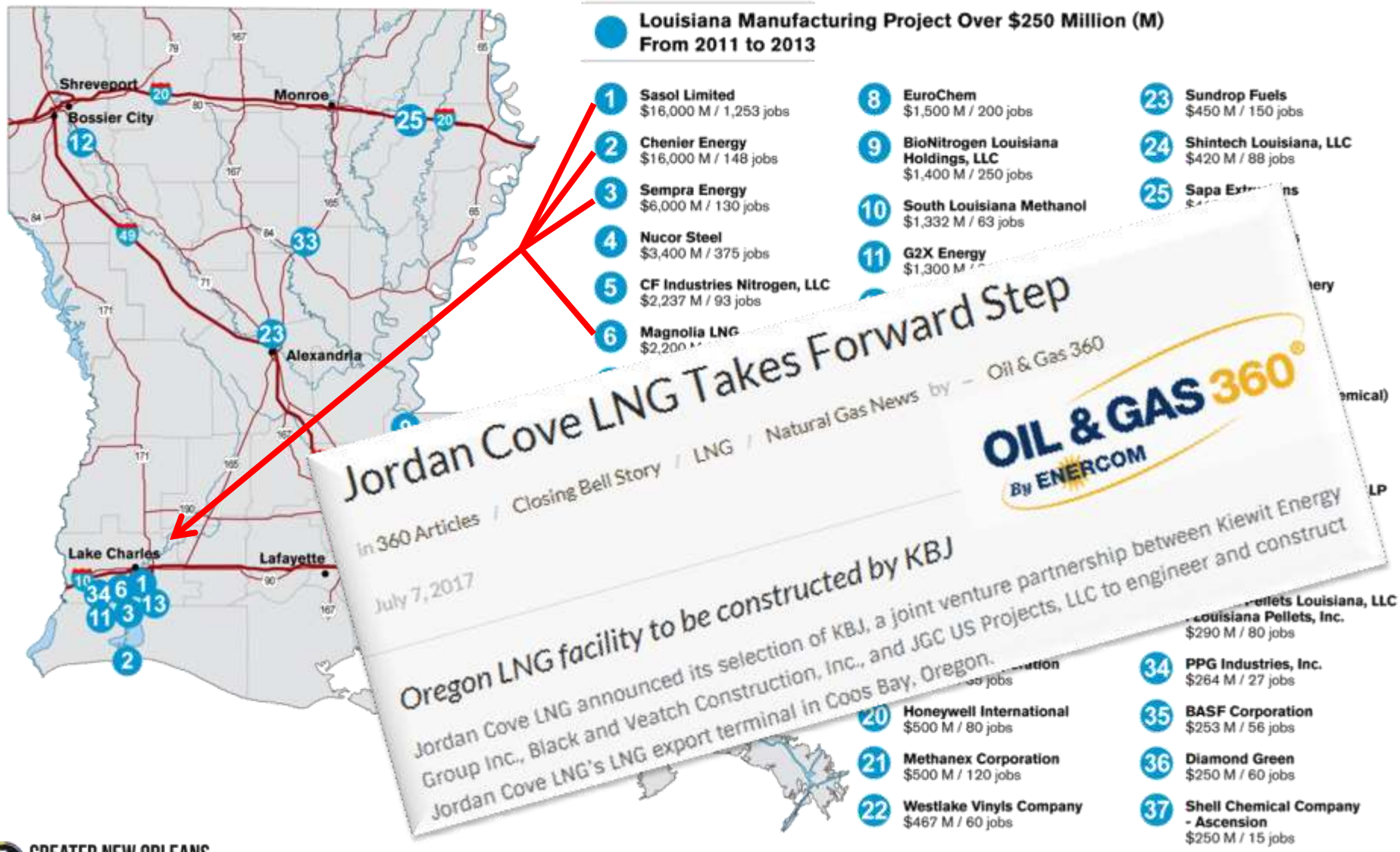


Projected LNG Cost Spreads Vs Market Gas Prices



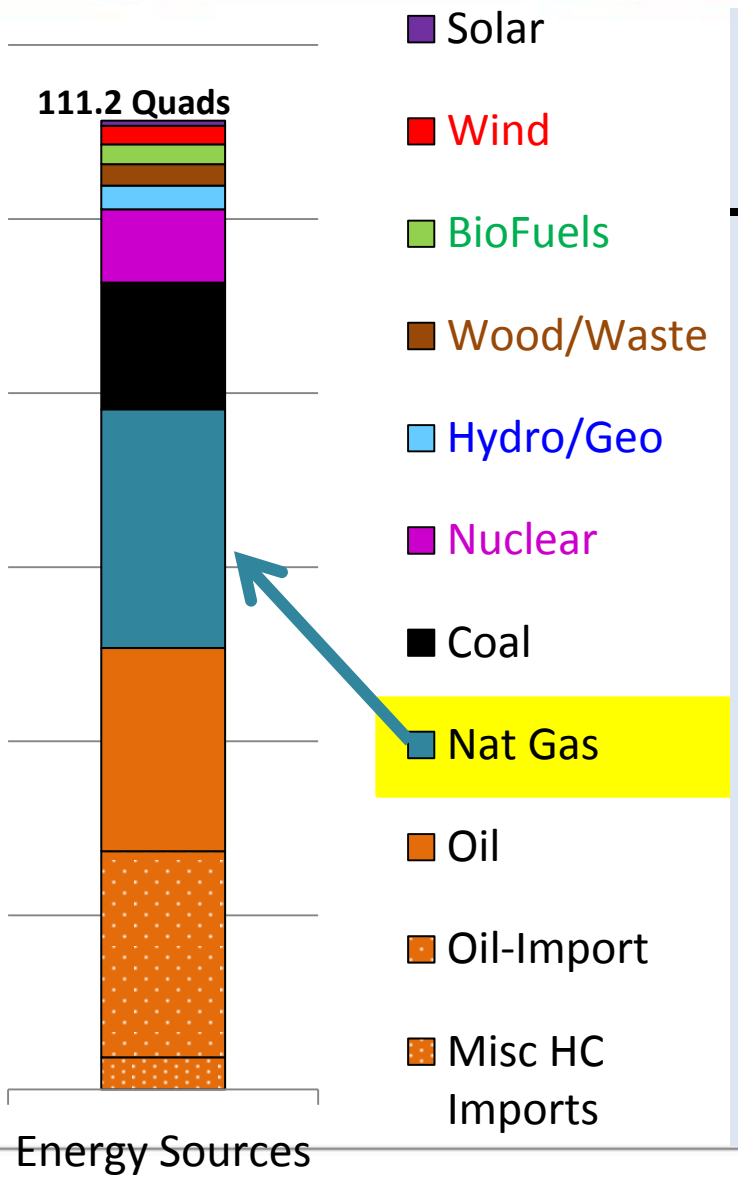
Louisiana Manufacturing is Booming

- Fueled by $3 / MMBtu natural gas, over $60B in ongoing developments, $42.2 B in LNG export Terminals.



GREATER NEW ORLEANS INC
REGIONAL ECONOMIC DEVELOPMENT

America's Natural Gas Resource & Dominance



Can America Dominate Natural Gas?

Yes, but there are challenges.

Do we meet our current domestic demand?

Yes and Exports are increasing significantly

Do we have the reserves to dominate?

Possibly not, but the uncertainty is huge.

How much excess capacity do we have to generate exports?

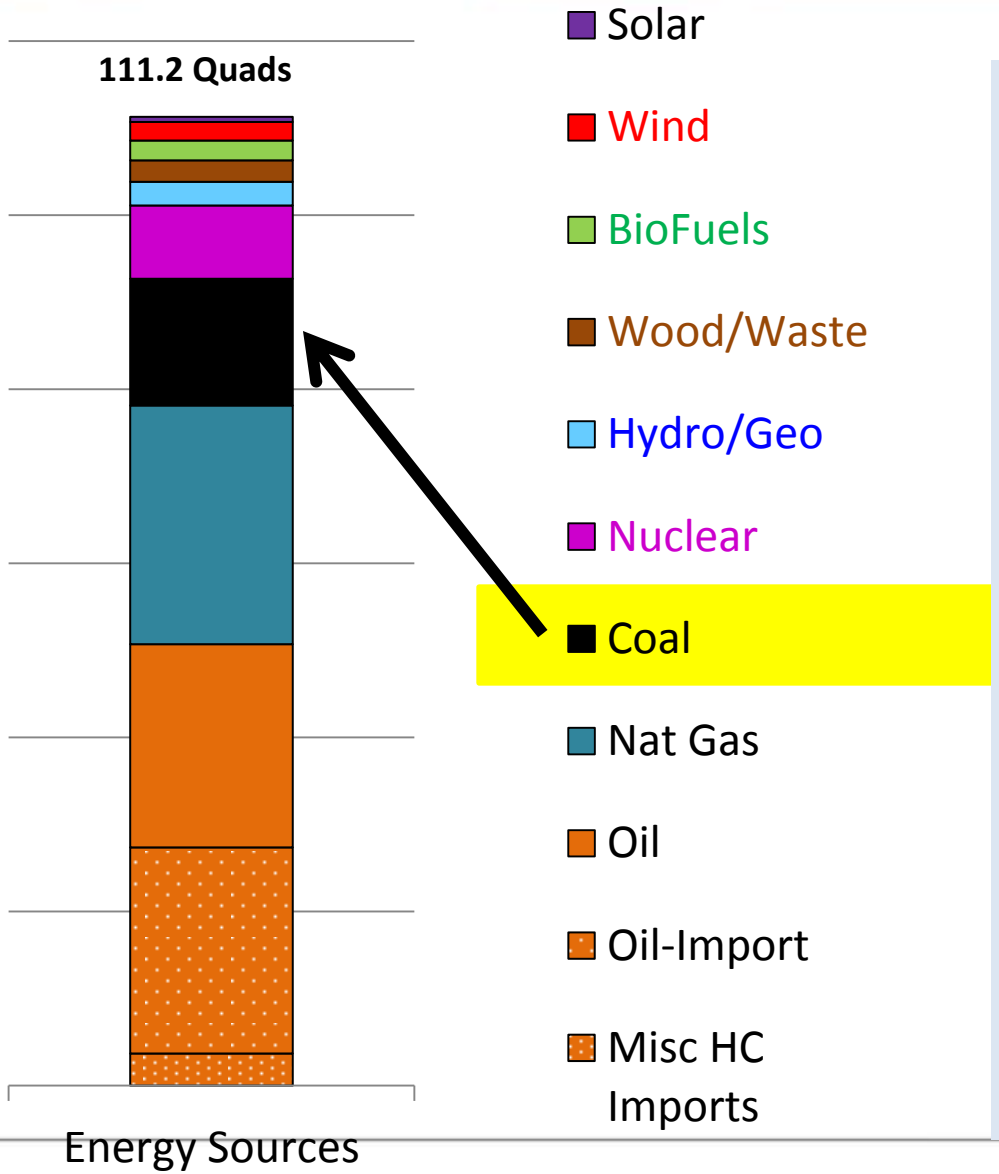
Short Term 5-7 yrs - Yes
Long Term ?????

Do we have the mechanisms and policies to enable exports?

Yes, and if we project forward typical US Upstream Industry Optimization and Efficiency The US could be a global player.

LLOG exploration

America's Energy Resources & Dominance



Can America Dominate Coal?

Do we meet our current domestic demand?

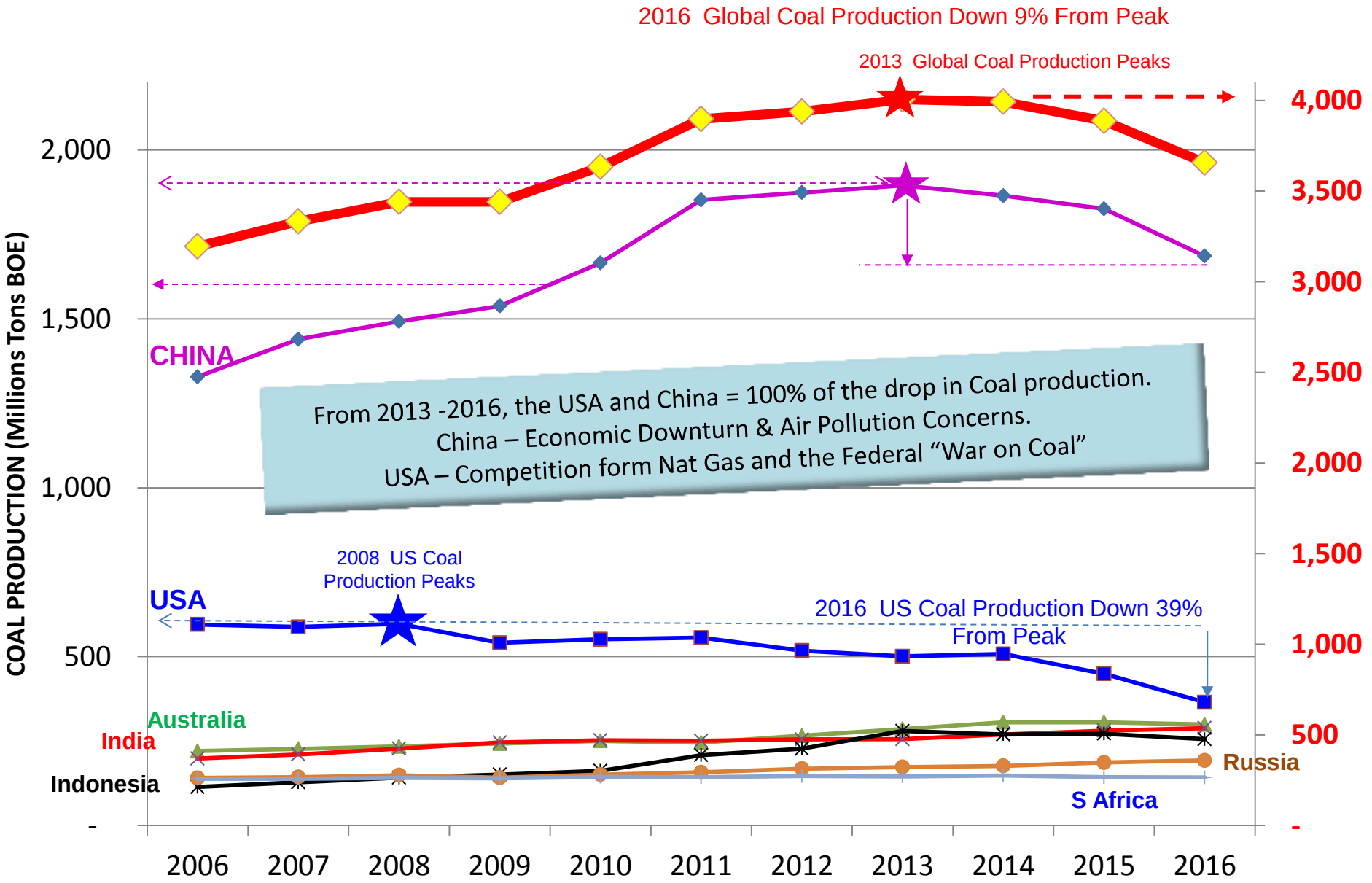
Do we have the reserves to dominate?

How much excess capacity do we have to generate exports?

Do we have the mechanisms and policies to enable exports?

LLOG exploration

Coal Production Trends - Top 7 Global Producers



Can the USA "Dominate Coal"?

- Domestically? Yes the US supplies 100% of US demand and even exports some coal.
- Internationally? Yes…..if……..and it is a big if.

- The US can compete in the export coal market.
  - The reserves are there.
  - US has the largest coal reserves in the world, capable of meeting US demand for 381 yrs.
  - China is a close #2 in reserves , but China only supplies 88% of their internal demand and is an importer of coal.

Global Coal - Proved Reserves

Country	Anthracite & Bituminous	Sub-Bit & Lignite	Total Coal (Mil Tons)	Global %	R/P
United States	**221,400**	**30,182**	**251,582**	**22.1%**	**381**
China	230,004	14,006	244,010	21.4%	72
Russian Fed	69,634	90,730	160,364	14.1%	417
Australia	68,310	76,508	144,818	12.7%	294
India	89,782	4,987	94,769	8.3%	137
Germany	12	36,200	36,212	3.2%	206
Ukraine	32,039	2,336	34,375	3.0%	*
Kazakhstan	25,605	-	25,605	2.2%	250
Indonesia	17,326	8,247	25,573	2.2%	59
Poland	18,700	5,461	24,161	2.1%	184
Turkey	378	10,975	11,353	1.0%	163
Reamining (27 <1%)	41,240	43,461	84,701	7.7%	127
Global Totals	**816,214**	**323,117**	**1,139,331**	**100.0%**	

Source: *BP Statistical Review of World Energy 2017*

- Can the US compete in the Global Coal Marketplace, and export significantly more coal?

Where is the Coal Market?.....ASIA

Global Coal - Production, Consumption, Imports & Exports

Country*	2016 Prod	2016 Comsump	Import/ (Export)
China	1,686	1,888	202
United States	365	358	(6)
Australia	299	44	(256)
India	289	412	123
Indonesia	256	63	(193)
Russian Fed	193	87	(106)
South Africa	142	85	(57)
Poland	52	49	(4)
Kazakhstan	44	36	(9)
Germany	40	75	35
Ukraine	17	32	14
Turkey	15	38	23
Japan	0.7	119	118
Taiwan	-	39	39
South Korea	0.8	82	81
Remaining Countries (<1%)	259	326	68
Global Totals	**3,656**	**3,732**	**74**

(2) Australia & Asia are also the largest global exporters of Coal

(1) ASIA is the largest current importer of Coal and will remain so going forward.

(3) The US?

US Coal Exports are on par with Poland.

(4) Can the US market coal to the Far East and compete?

LLOG exploration

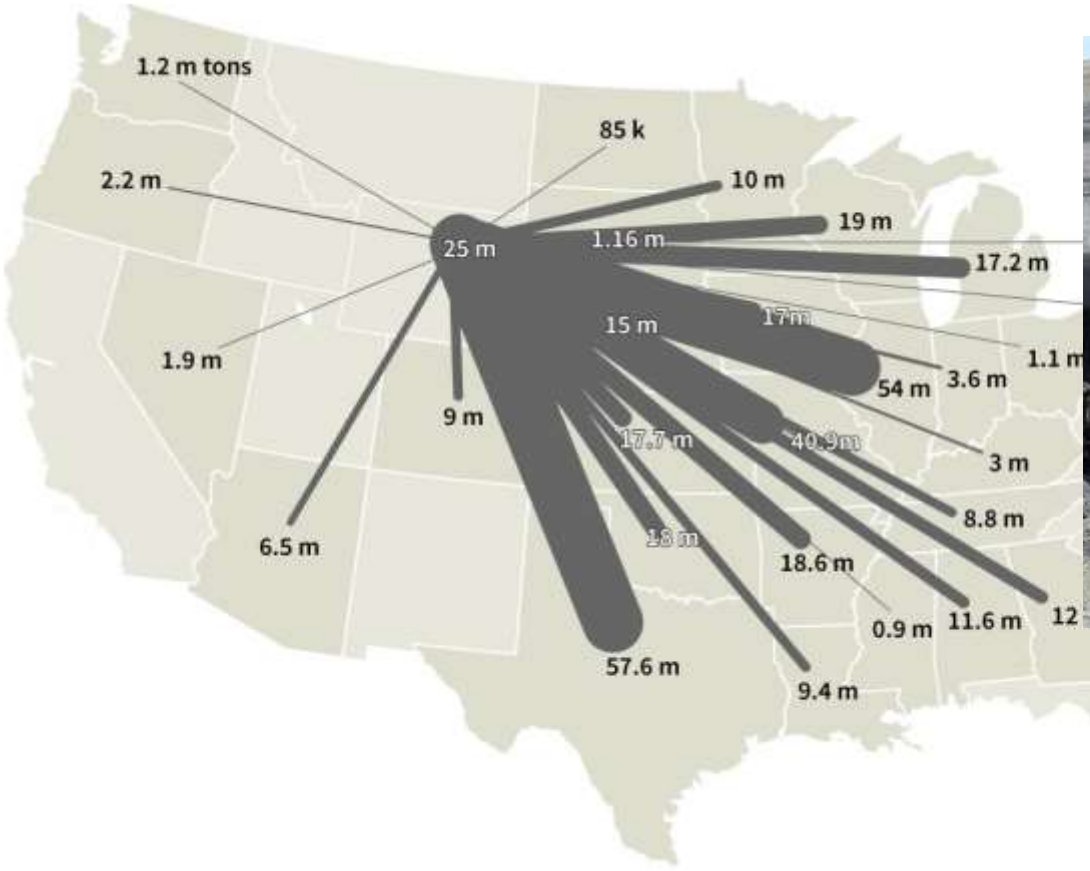
Where is the Coal in the US?

2015 State Coal Production	# Mines	Production ST x1000	%	Capacity ST x1000
Wyoming	16	375,773	42%	474,040
West Virginia Total	151	95,633	11%	122,298
Kentucky Total	210	61,425	7%	78,518
Illinois	23	56,101	6%	77,365
Pennsylvania Total	195	50,031	6%	61,849
Montana	6	41,864	5%	51,900
Other States "East" (18) <5%	206	89,050	10%	139,604
Other States "West" (11) <5%	27	125,679	14%	159,315
Total US	834	895,556	100%	1,164,889

- **US Coal Mines Excess Capacity : ~270 Mil Tons/Yr.**
- **US Excess Capacity = Total Exports of Australia the worlds' largest exporter**
- **>60% of US Coal Reserves are in the Western US, dominated by Wyo. Mt. & N Dakota.**

Does the US have the "Mechanisms" to Export Coal?

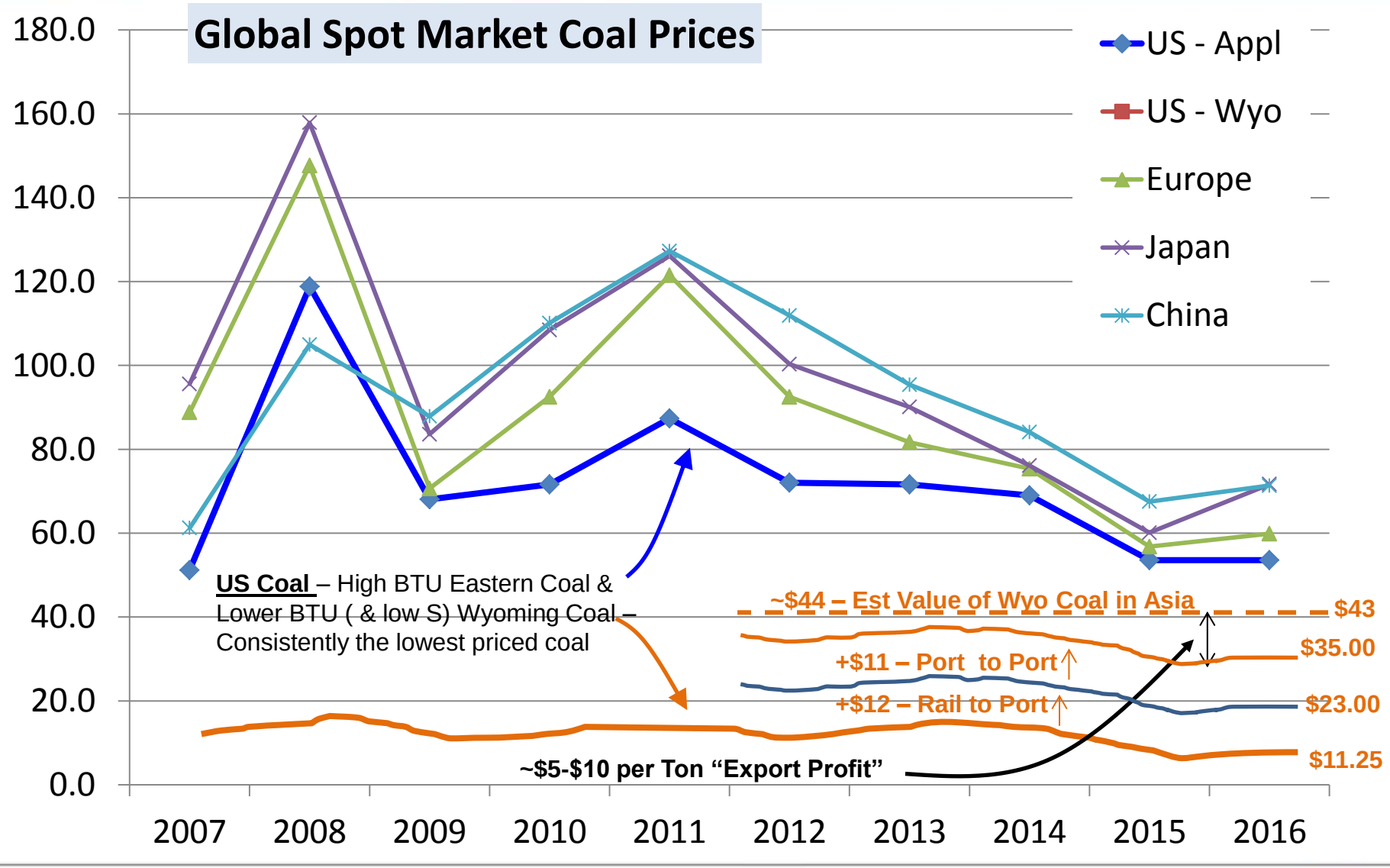
US Coal Transport – 98% Domestic, 2% Global Export



- Wyoming Coal – "consumed in Wyo" 7% - Exported to other states & countries 93%
- 2% exported West, 98% consumed or sent East.

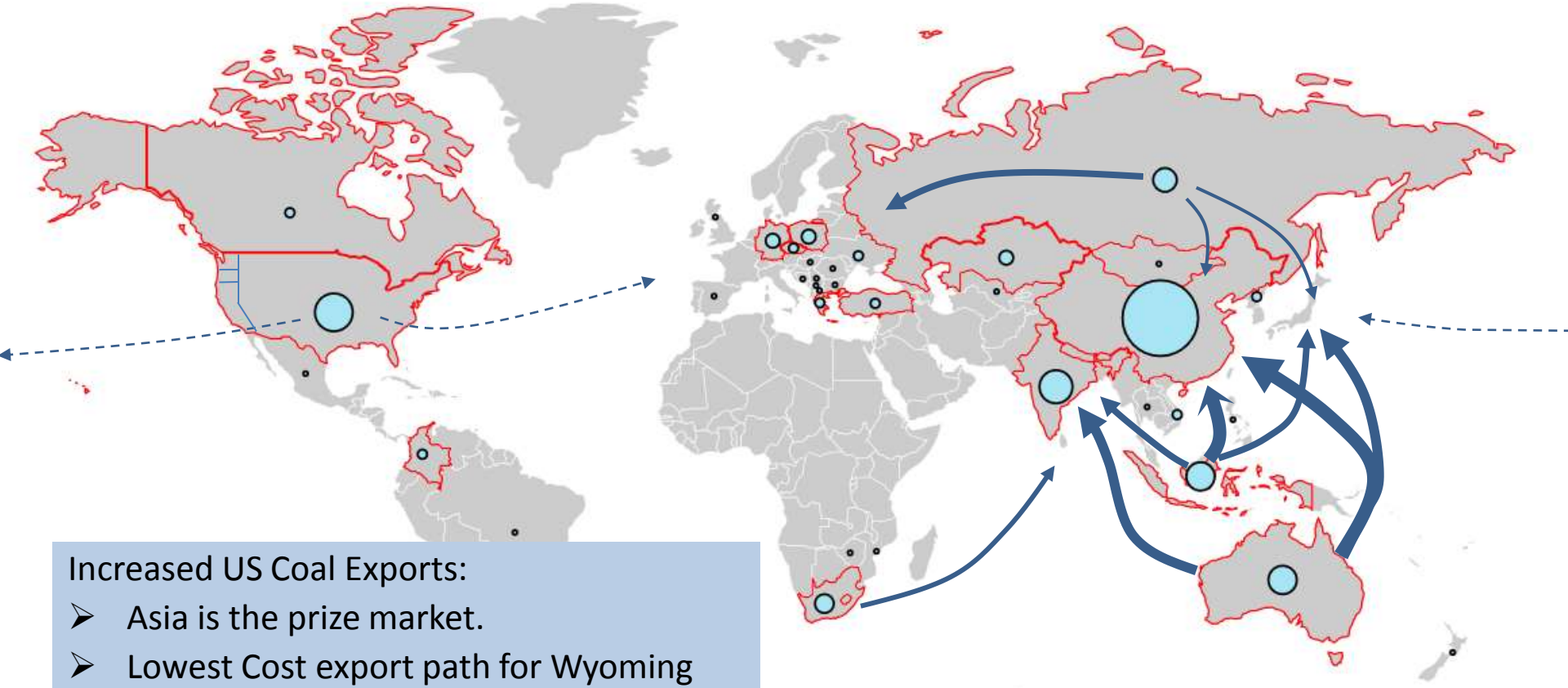
LLOG exploration

Coal Price Vs Production Cost Spread



Raw Data Source: BP Statistical Review of World Energy 2017

Global Coal Production & Export Flows



Increased US Coal Exports:

- Asia is the prize market.
- Lowest Cost export path for Wyoming Coal is via US West Coast ports.
- Ca. Wa. & Or. state policy/politics is preventing Wyoming coal from accessing the Asian Markets

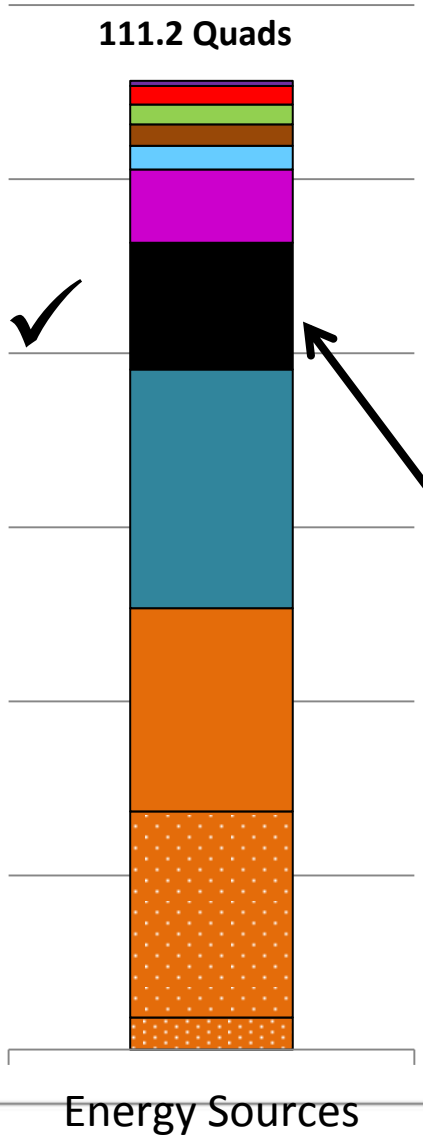
LLOG exploration

Global Coal Production & Export Flows

Increased US Coal Exports:

- Asia is the prize market.
- Lowest Cost export path for Wyoming Coal is via US West Coast ports.
- Ca. Wa. & Or. state policy/politics is preventing Wyoming coal from accessing the Asian Markets

America's Energy Resources & Dominance



- Solar
- Wind
- BioFuels
- Wood/Waste
- Hydro/Geo
- Nuclear
- Coal
- Nat Gas
- Oil
- Oil-Import
- Misc HC Imports

Can America Dominate Coal?

YES

Do we meet our current domestic demand?

YES

Do we have the reserves to dominate?

YES

Do we have excess capacity do we have to generate exports?

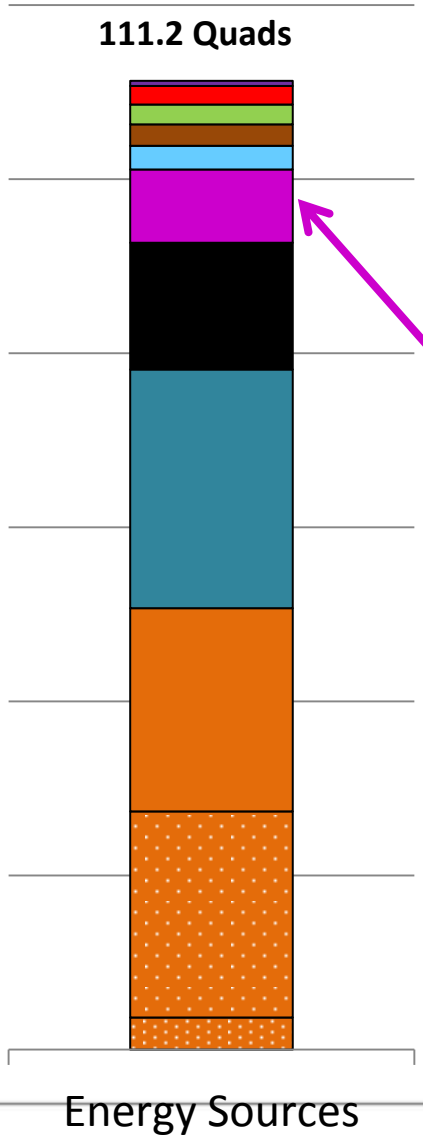
Yes > Current largest exporter

Do we have the mechanisms and policies to enable exports?

We have the ports, we need the export policies.

LLOG exploration

America's Energy Resources & Dominance



- Solar
- Wind
- BioFuels
- Wood/Waste
- Hydro/Geo
- Nuclear
- Coal
- Nat Gas
- Oil
- Oil-Import
- Misc HC Imports

Can America Dominate Nuclear Energy?

Do we meet our current domestic demand?

What is the status of our "Nuclear reserves"?

Do we have the capability/capacity to generate "nuclear electricity" to export to the N. American grid?

LLOG exploration

What is the "role/status" of US nuclear energy ?

Global Nuclear Energy Production* - Levels/Trends

Country	2006	2016	Change '05-'15	'16 Share
USA	**187.5**	**191.8**	**2.3%**	**32.4%**
France	101.9	91.2	-10.5%	15.4%
China	12.4	48.2	288.7%	8.1%
Russian Fed	35.4	44.5	25.7%	7.5%
S Korea	33.7	37.3	10.7%	6.2%
Canada	22.0	23.2	5.5%	3.9%
Germany	37.9	19.1	-49.6%	3.2%
Ukraine	20.4	18.3	-10.3%	3.1%
United Kingdom	17.1	16.2	-5.3%	2.7%
Sweden	15.2	14.2	-6.6%	2.4%
Spain	13.6	13.3	-2.2%	2.2%
Belgium	10.6	9.8	-7.5%	1.7%
India	4.0	8.6	115.0%	1.4%
Taiwan	9.0	7.2	-20.0%	1.2%
Czech	5.9	5.5	-6.8%	0.9%
Finland	5.2	5.3	1.9%	0.9%
Switzerland	6.3	4.8	-23.8%	0.8%
Japan	69.0	4.0	-94.2%	0.7%
Countries <5	28.1	30.0	6.8%	5.1%
Global	**635.2**	**592.5**	**-6.7%**	**100%**

10 Yr TREND			
	>+20%	+10-20%	+0-10%
	>-20%	-10 -20%	0-10%

USA is the Global Leader in Total Nuclear Energy Prod. @ 32%….

……..but on a per capita basis lags many countries.

Green" movement in Germany & Fukushima in Japan, & "has led to significant output declines in Nuclear Energy.

China, India & Russia have shown the strongest growth rates in Nuclear Energy in the last 10 yrs..

Global Nuclear Energy Production* Per Capita

Country	2016 Prod*	Per Capita Prod*	2016 Pop
Sweden	14.2	1.42	10.0
France	91.2	1.36	67.0
Finland	5.3	0.96	5.5
Belgium	9.8	0.87	11.3
S Korea	37.3	0.73	51.0
Canada	23.2	0.64	36.0
USA	**191.8**	**0.59**	**323.0**
Switzerland	4.8	0.58	8.3
Czech	5.5	0.52	10.5
Ukraine	18.3	0.41	45.0
Russian Fed	44.5	0.31	144.0
Taiwan	7.2	0.31	23.6
Spain	13.3	0.29	46.5
United Kingdom	16.2	0.25	65.0
Germany	19.1	0.23	83.0
China	48.2	0.03	1,379.0
Japan	4.0	0.03	127.0
India	8.6	0.01	1,324.0

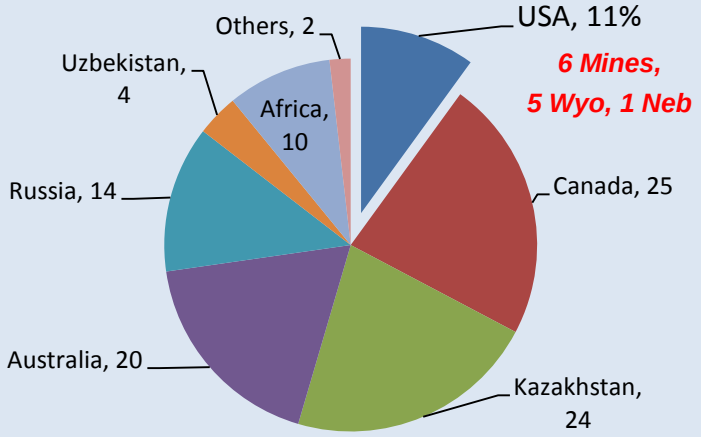
* Million Tons of BOE/Yr

Raw Data Source: BP Statistical Review of World Energy 2017

LLOG exploration

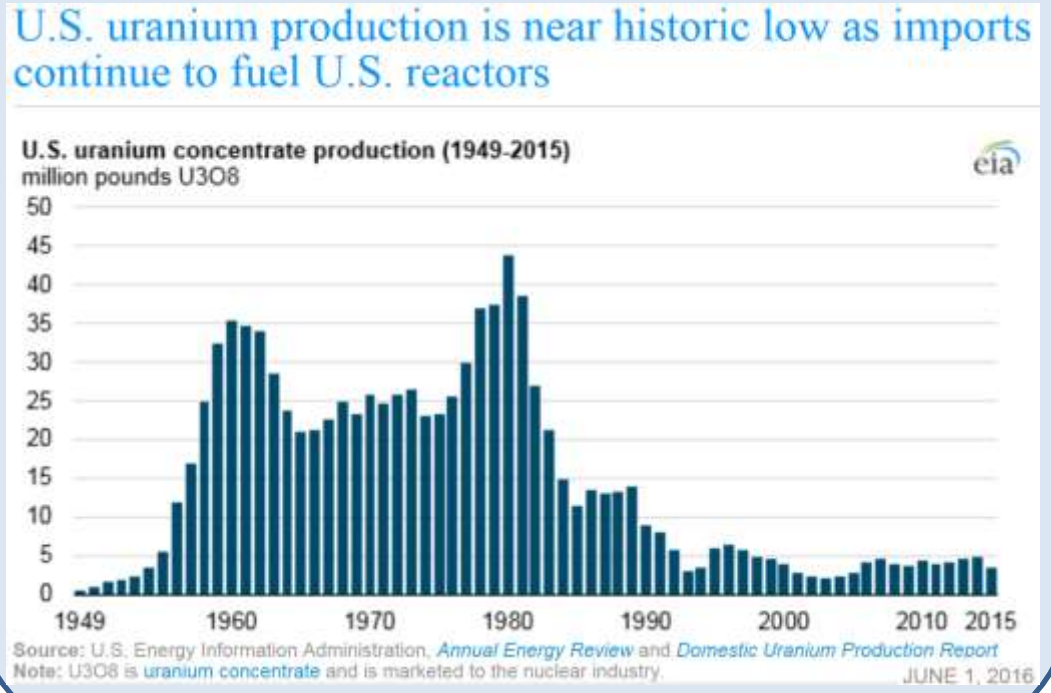
US Nuclear Fuel Sources, Production and Capacity/Reserves

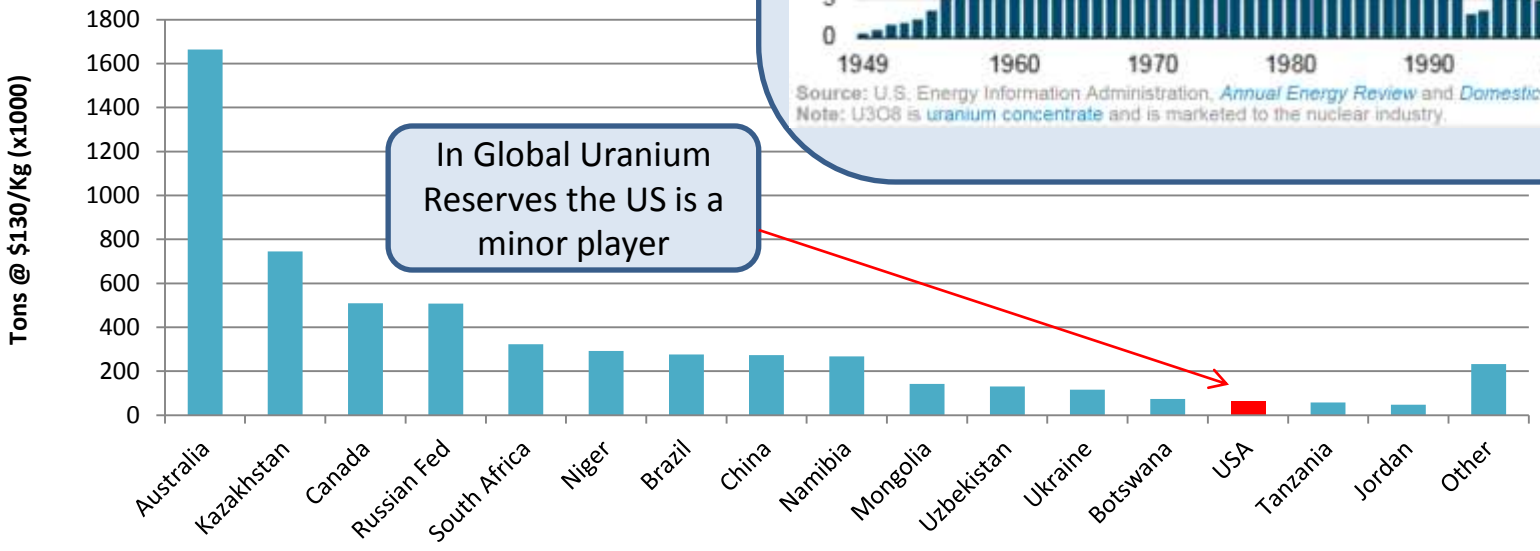
US Uranium Sources (2016 – EIA)



The US imports 89% of the Uranium used in Domestic Nuclear Fuel

Our Domestic Production is the same as 1940- Early 1950s

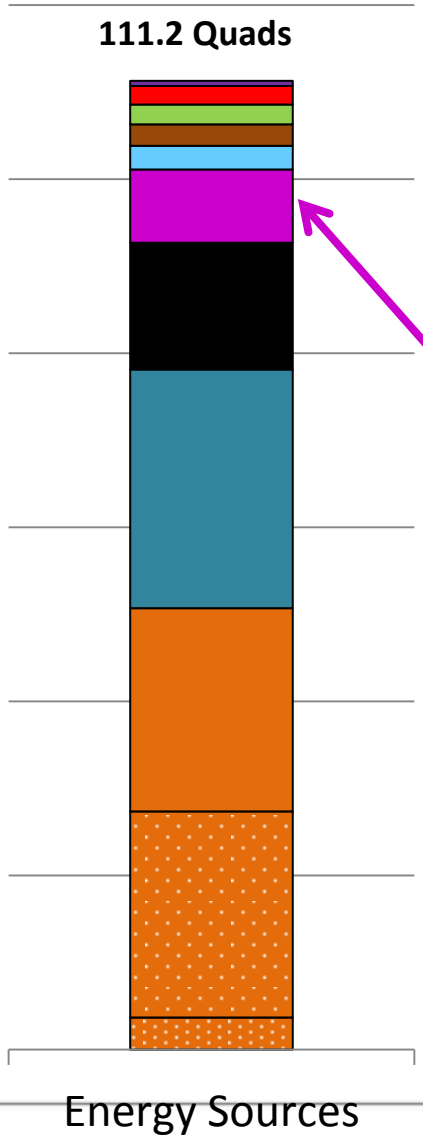




Raw Data Source: US EIA Annual Energy Review 2016

LLOG exploration

America's Energy Resources & Dominance



- Solar
- Wind
- BioFuels
- Wood/Waste
- Hydro/Geo
- Nuclear
- Coal
- Nat Gas
- Oil
- Oil-Import
- Misc HC Imports

Can America Dominate Nuclear Energy?

No

Do we meet our current domestic demand?

NO, in terms of the fuel resource.

What is the status of our "Nuclear Fuel reserves"?

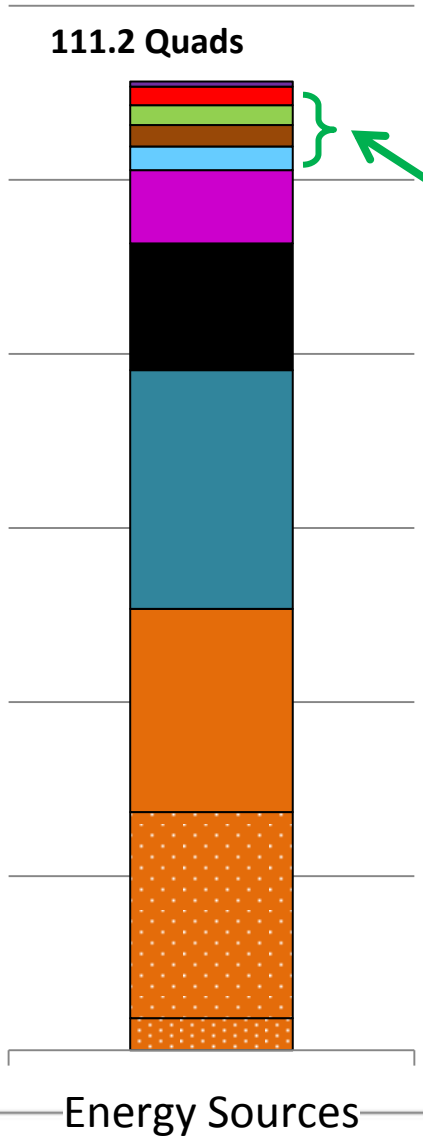
Minimal on a global scale & trends are all down.

Do we have the capability/capacity to generate "nuclear electricity" to export to the N. American grid?

No, unless we can ramp up the approval and construction processes.

LLOG exploration

America's Energy Resources & Dominance



- Solar
- Wind
- BioFuels
- Wood/Waste
- Hydro/Geo
- Nuclear
- Coal
- Nat Gas
- Oil
- Oil-Import
- Misc HC Imports

Can America Dominate Renewable Energy?

Do we meet our current domestic demand?

No, Domestic "demand" for renewables is a "marketing manufactured" demand.

What are the impact of renewable energy impacts?

Do we have the capability/capacity to generate "renewable electricity" to export to the N. American grid?

????

LLOG exploration

Renewable Energy Impacts

Visual Effects

- Hydro Electric – Close to maximized – more dams are not tolerated and efficiency gains often can not justify the cost to replace inefficient turbines.
- Wind turbines must be in exposed areas = highly visible. They are considered unsightly by many people, and concerns have increased with the larger size of new generation turbines.

Noise

- Wind turbines produce aerodynamic noise, from air passing over the blades and mechanical noise from the moving parts of the turbine, especially the gearbox. Better designs have reduced noise, and research continues. Wind farms developed far from highly populated areas are, by definition, less offensive….to the people who do not live there.

Electromagnetic Interference

- Wind turbines may scatter electromagnetic signals causing interference to communication systems. Appropriate siting (avoiding military zones or airports) can minimize this impact.

Gulf of Mexico Hypoxia Zones

- Summer of 2017 largest ever – due in part to run-off from farms in the drainage . Coincidence with corn ethanol production? – Possibly.

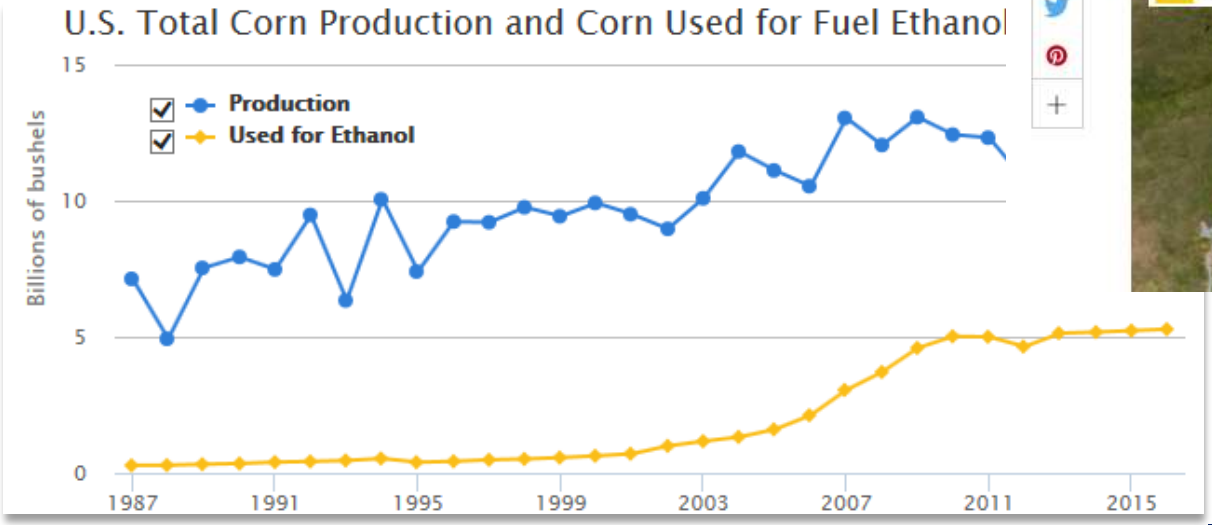
Bird Impacts

- Birds get killed when they collide with the rotating blades of a turbine. Migratory species are at higher risk than resident species. Siting the turbines away from migratory routes reduces the impact. What would happen if “Big Wind” were treated like “Big Oil”?

Record Hypoxia = F(Temps, Weather & "Plankton Food")

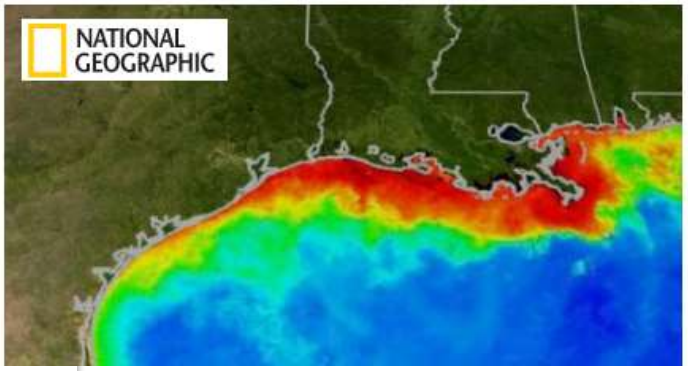
As we generate more "renewable ethanol" we also generate more "Hypoxia Food" that leads to increased size Dead Zones in the Gulf of Mexico.

Do we really want to add "nutrients" to our oceans to adsorb CO2 and increase the size of our dead zones?



New Jersey-Size 'Dead Zone' Is Largest Ever in Gulf of Mexico

Scientists report the latest data from the Upper Gulf of Mexico, and the results aren't good



United States Department of Agriculture
National Agricultural Statistics Service

USDA Reports Record High Soybean Acreage, Corn Acres Down

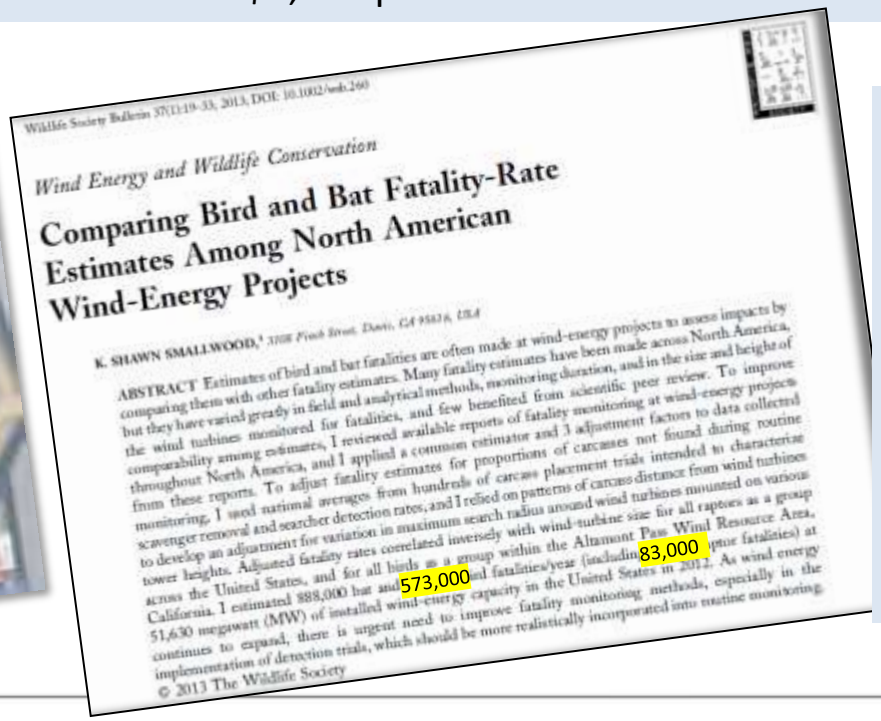
WASHINGTON, Jun. 30, 2017 – The U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) estimated a record high 89.5 million acres of soybeans planted in the United States for 2017, up 7 percent from last year, according to the Acreage report released today. Corn area planted is estimated at 90.9 million acres, down 3 percent from

Wind Energy Impacts – Bird Fatality

Perception: Oil and Gas operations are not held to tough environmental standards

Reality: We are held to tough environmental as should all industries but other energy industries are treated differently, ex Wind Energy

Exxon Mobil agreed to pay $600,000 in penalties after approximately 85 migratory birds died of exposure to hydrocarbons at some of its natural gas facilities across the Midwest, over a 5 year span . The fine amounts to about $7,000 per dead bird. *New York Times 4-13-09*



Wildlife Society Bulletin 37(1):19–33; 2013; DOI: 10.1002/wsb.260

Wind Energy and Wildlife Conservation

Comparing Bird and Bat Fatality-Rate Estimates Among North American Wind-Energy Projects

K. SHAWN SMALLWOOD,[1] 3108 Finch Street, Davis, CA 95616, USA

ABSTRACT Estimates of bird and bat fatalities are often made at wind-energy projects to assess impacts by comparing them with other fatality estimates. Many fatality estimates have been made across North America, but they have varied greatly in field and analytical methods, monitoring duration, and in the size and height of the wind turbines monitored for fatalities, and few benefited from scientific peer review. To improve comparability among estimates, I reviewed available reports of fatality monitoring at wind-energy projects throughout North America, and I applied a common estimator and 3 adjustment factors to data collected from these reports. To adjust fatality estimates for proportions of carcasses not found during routine monitoring, I used national averages from hundreds of carcass placement trials intended to characterize scavenger removal and searcher detection rates, and I relied on patterns of carcass distance from wind turbines to develop an adjustment for variation in maximum search radius around wind turbines mounted on various tower heights. Adjusted fatality rates correlated inversely with wind-turbine size for all raptors as a group across the United States, and for all birds as a group within the Altamont Pass Wind Resource Area, California. I estimated 888,000 bat and [573,000] bird fatalities/year (including [83,000] raptor fatalities) at 51,630 megawatt (MW) of installed wind-energy capacity in the United States in 2012. As wind energy continues to expand, there is urgent need to improve fatality monitoring methods, especially in the implementation of detection trials, which should be more realistically incorporated into routine monitoring.

If the Wind Industry (operating in the same footprint) were held to the same standard, their 83,000 raptor fatalities each year would generate fines of 581 million $/yr, and the 573,000 total bird kill for 2012 would yield 4.01 billion $/yr

LLOG exploration

Renewable Energy - Quick Look at Nirvana – The Elec Car!

- Perception – Electric Cars use less energy and have no emissions.
- Perception – if "critical production mass" and an adequate recharging network established Electric Cars will be the future.
- What is the reality?

I charge my car, pay the bill & drive with no CO2 emissions! Yeay!!!

Where does the electricity come from? The wall outlet!

The wall outlet gets electricity from ….the power plant

Fossil Fuel or Nuclear

The power plant gets fuel from the well or the mine.

Refinery or Gas-to-Liq

So how is an Elec Car better in terms of CO2 or $ from my current car?

LLOG exploration

Let's Look at the US Avg – Electric Vehicle CO2 "Budget"

Power mix assumptions.
Maxed out on Nukes & Hydro.

New energy will come from both conventional & renewables (i.e. subsidies continue).

How much CO_2 will be generated to get those electrons (KWHrs) to my house or charging station? (IPCC & EIA)

For the average driver in the USA, Do I trade in my 35 MPG Accord for a Tesla Model 3 to reduce CO2?

United States

Fuel Type	USA Elec Power Mix	Growth? Yes / No	Used for Future Elec Vech?	Lbs CO2/ KWH	5.5% Incl Trans Loss	Wgtd Avg Lbs CO2 / KWH
Coal (HC)	30.4%	Yes*	30.4%	3.03	3.20	1.319
Large Hydro	6.5%	No				
Natural Gas (HC)	34.1%	Yes	34.1%	1.21	1.27	0.589
Nuclear	19.7%	No				
Oil (HC)	0.9%	Yes	0.9%	2.28	2.41	0.029
Renewables	8.4%					
Biomass	1.5%	Yes	1.5%	2.74	2.89	0.059
Geothermal	0.4%	Yes	0.4%	0.14	0.15	0.001
Solar	0.9%	Yes	0.9%	0.15	0.16	0.002
Wind	5.6%	Yes	5.6%	0.04	0.05	0.004
Total	100.0%		73.8%			**2.002**

The electricity that comes out of the wall in the USA averages 2.0 lbs of CO2 per KWH.

NO!

I will put more CO2 into the atmosphere,

Pay more in the total cost of ownership

And wait longer to "fuel" my vehicle.

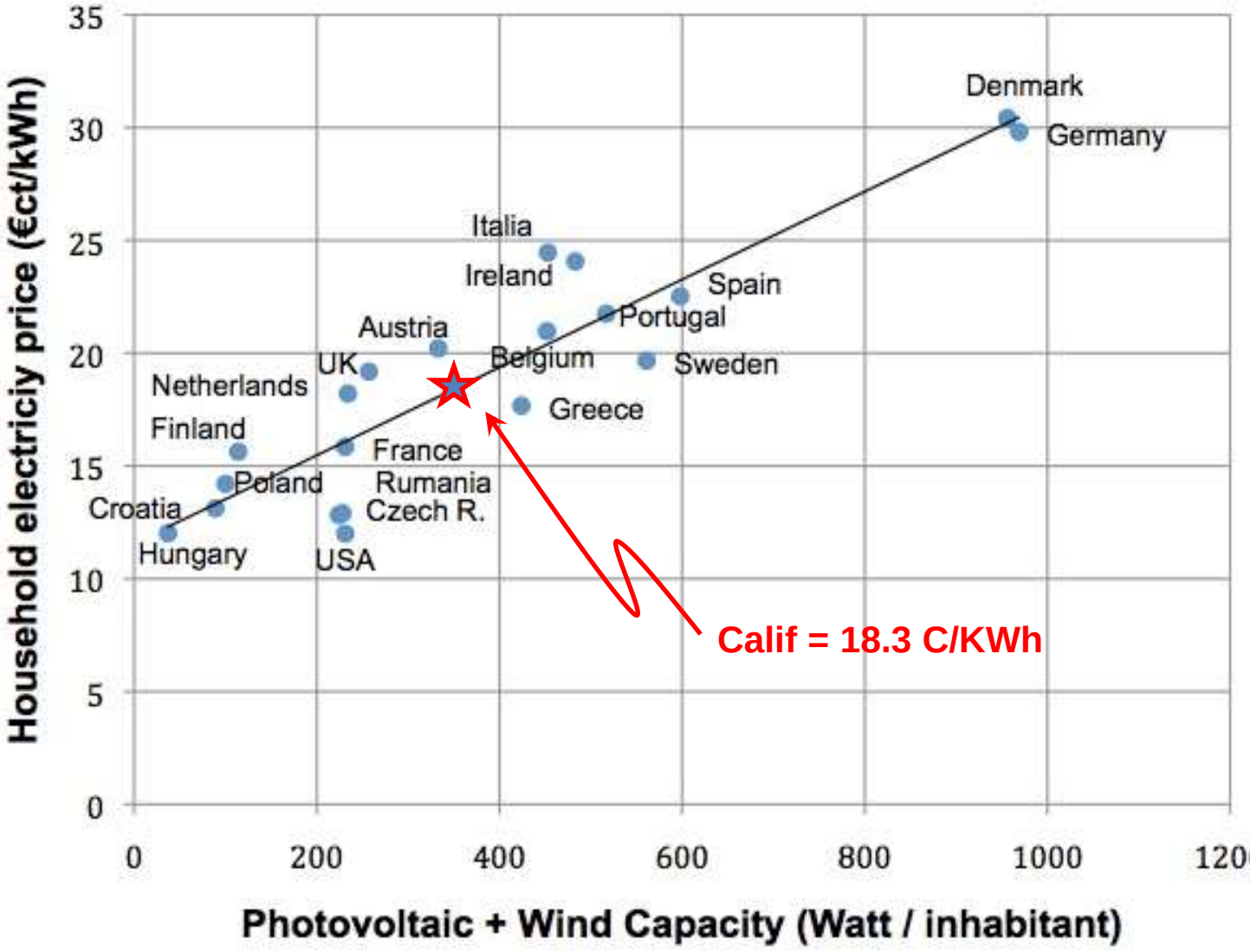
Average US Power Grid

Miles Traveled	Charge Time (Hrs)	kWh	2.002 Lbs CO2 Per KWH	Gasoline 35 MPG 19.6 PPG	% Less CO2
50	1.7	16.6	33.3	28.0	-16%
100	3.5	33.3	66.6	56.0	-16%
150	5.2	49.9	99.9	84.0	-16%
200	6.9	66.6	133.3	112.0	-16%
250	8.7	83.2	166.6	140.0	-16%
300	10.4	99.8	199.9	168.0	-16%

@ 60 MPH Charge time = 2x Drive Time

If I believe I need to reduce my carbon footprint to "Save the planet" then I should focus on efficiency and not drive around in an electric car.

Impact to Consumers – The High Cost Road to Renewables



Should the USA "Dominate" an energy source that is costly, inefficient, and poses surge, transfer and load shedding issues that result in the actual power supplied equal to only a fraction of the "name plate capacity"?

ANSWER: NO, Be a strategic follower not a leader in renewables

"Hidden Consequences of Intermittent Electricity Production" Arguments Review European Science Vol 2 #2 2017,
Jozef Ongena, István Markó, Raymond Koch, Anne Debeil http://revue-arguments.com/articles/index.php?id=76

Disclosure: I am a unconventional energy user

I have solar water heat (pool) and solar panels for electricity.

Solar water heater for the pool = No brainer.

Solar Electricity Panels in forested South Louisiana = Total Looser

Solar Panels – Payout – 21 yrs. even with an 80% discounted after tax cost.

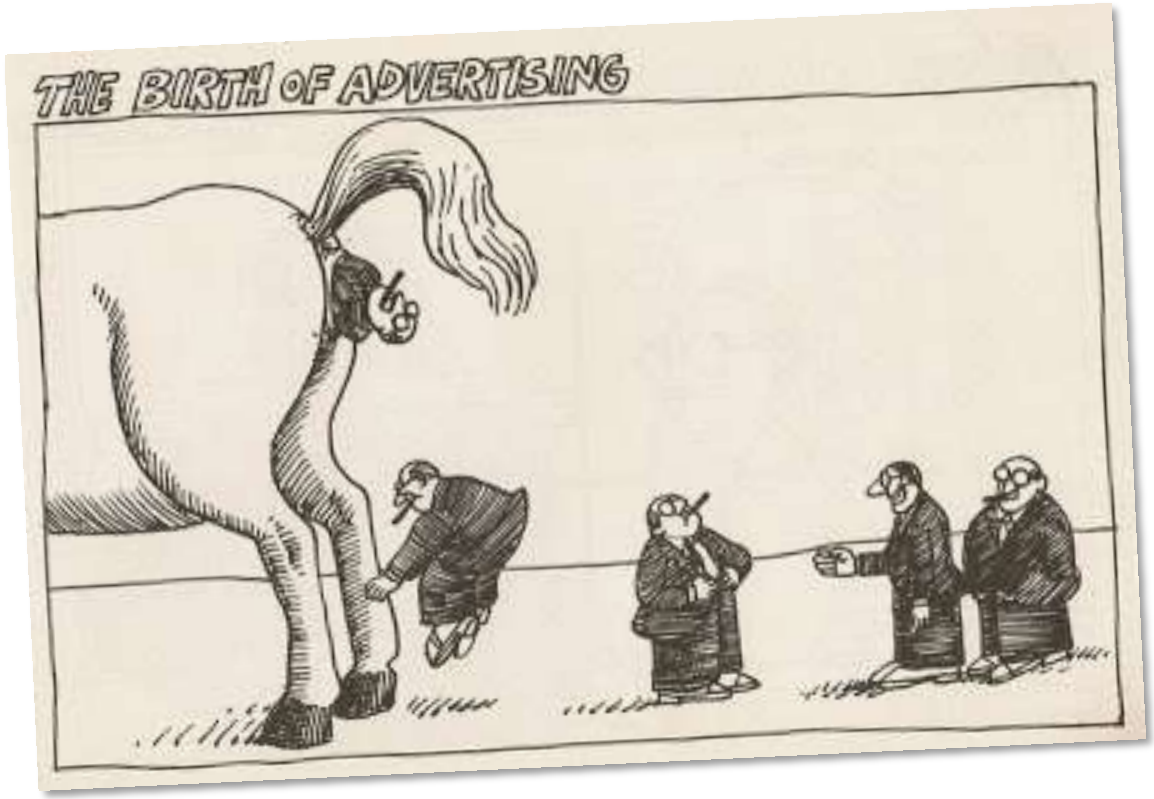
- ✓ I firmly support unconventional/"green" energy where it works on it's own merits without any subsidies.
- ✓ But thanks to all the taxpayers in the room for my subsidies.

Renewable Energy / "CO_2 Fear" – Dominated by Media/Advertising

What is the percentage of carbon in sucrose?

Element	Symbol	Mass Percent
Hydrogen	H	6.478%
Carbon	C	42.106%
Oxygen	O	51.415%

WOW! Domino is marketing sugar with no carbon, leaving only Hydrogen and Oxygen ……powdered water?



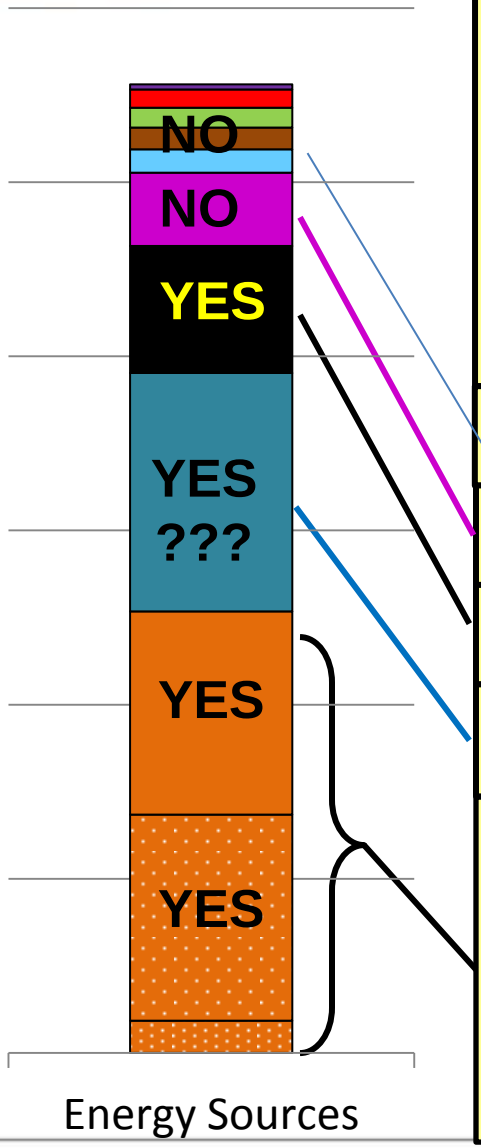
To survive long term, renewables simply need to compete on the open energy market.

LLOG exploration

Can the US Dominate Energy?

- US Energy Overview –
  Where do we get energy, how do we use energy?
- Review the Trump Administrations Energy Goals & Strategy – to date.
- What does it mean to “DOMINATE” energy?
- SWOT Analysis – Strengths, Weaknesses, Opportunities & Threats Analysis of America’s ability to “DOMINATE” energy.
- Answer the question, Can the US dominate Energy for each source, Oil, Natural Gas, Coal, Nuclear, Renewables.

America's Energy Resources, Y/N Dominance Scorecard



- Solar
- Wind
- BioFuels
- Wood/Waste

Short & Long Term – NO.
The USA should not dominate "Subsidy Energy"
Unless the energy is cost effective W/O Government subsidy & Competes based on the full life cycle cost/benefits.

- Hydro/Geo — **Short & Long Term – No, Limited New Sites & Cost**
- Nuclear — **Short Term – No**, **Long Term – No, Fuel Reserve Issues**
- Coal — **Short Term – No**, US can't export, **Long Term - Yes**
- Nat Gas — **Short Term – Yes**, if the US can export, **Long Term - ?**
- Oil
- Oil-Import
- Misc HC Imports

Yes – but the "tight oil" or shale oil fracking play needs to be real, sustained and supported

USA Energy DOMINANCE?

Questions?

Yes……. If all energy competes in open markets.

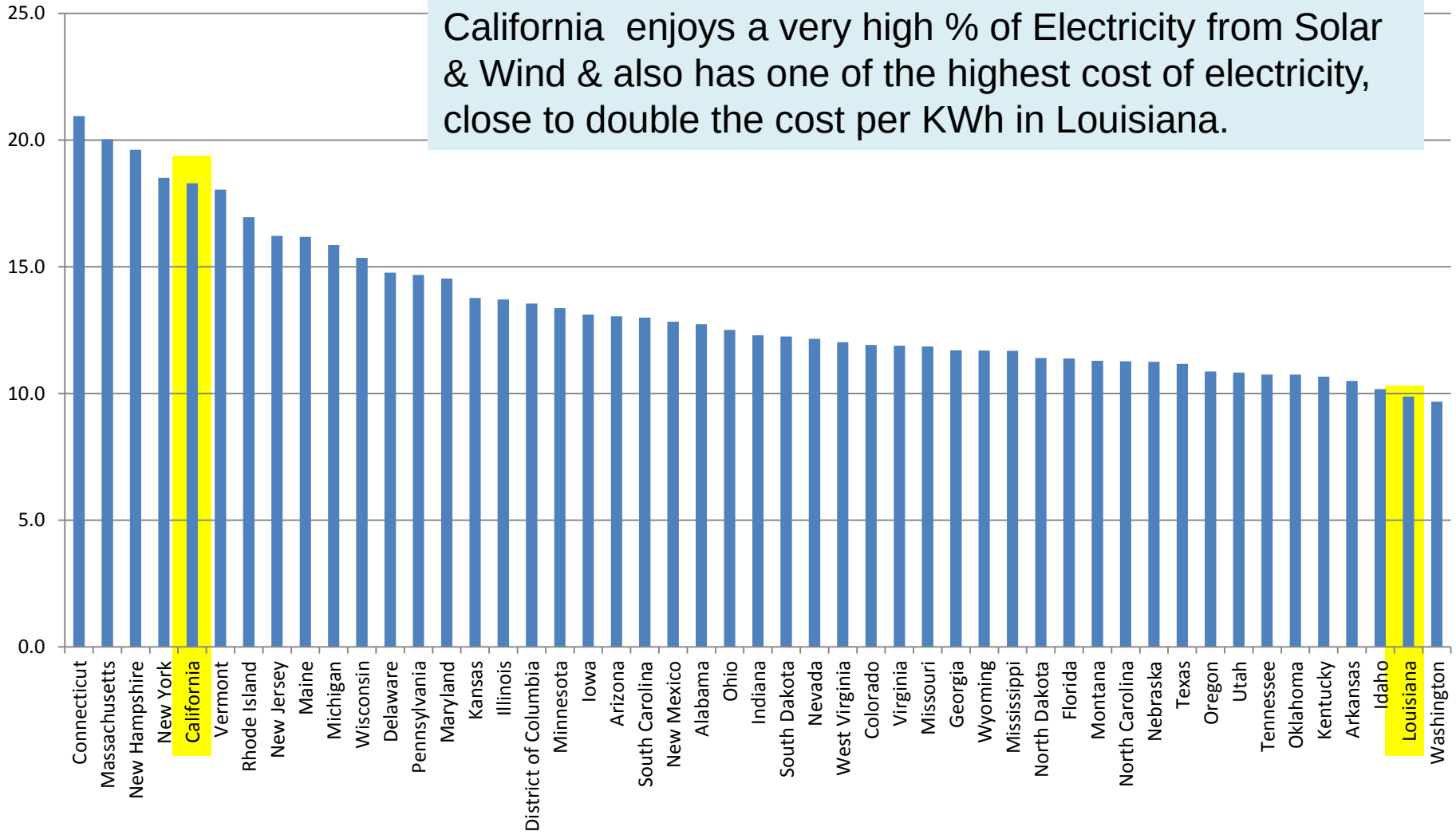
BACK-Up Slides

Why can't we all "be like California"?

California Energy Budgets Estimates 2015			2015			
			California Energy Est - Trillion Btu			
Category	Form	Use	Production	Consumption	Imported %	
Coal	**Hydro-Carbon**		**0.00**	**31.00**	**100%**	
Crude Oil	**Hydro-Carbon**	**Trans Fuel**	**1,150.70**	**3,054.60**	**62%**	
Motor Gasoline excl. Ethanol	Hydro-Carbon	Trans Fuel		1,684.70		65.1% Imported Hydro Carbons Coal, Crude, Gas.
Distillate Fuel Oil	Hydro-Carbon	Trans Fuel		566.70		
Jet Fuel	Hydro-Carbon	Trans Fuel		637.60		
LPG	Hydro-Carbon	Trans Fuel		48.90		
Residual Fuel	Hydro-Carbon	Trans Fuel		116.70		
Other Petroleum	Hydro-Carbon	Trans Fuel		-		
Renweable Energy			**743.40**	**727.10**	**-2%**	
Biomass	Hydro-Carbon	Trans Fuel	27.80	288.50		
Other Renewables	Solar, Wind, Geo	Elec	586.90	438.60		70.3% Imported Elec.
Hydroelectric Power	Hydro-Elec	Elec	128.70	128.70		
Natural Gas	Hydro-Carbon	Elec	265.20	2,381.70	89%	
Nuclear Electric Power	Nuclear	Elec	193.50	193.50	0%	
Net Interstate Flow of Electricity	Hydro-Carbon	Elec		805.60	100%	
Total Energy Budget			**2,352.80**	**7,193.50**	**67.3%**	
Source: EIA http://www.eia.gov/state/?sid=CA						

Answer – Every State can not "import" 2/3 of their energy.

May 2017 US Electricity Price C/KWh by State

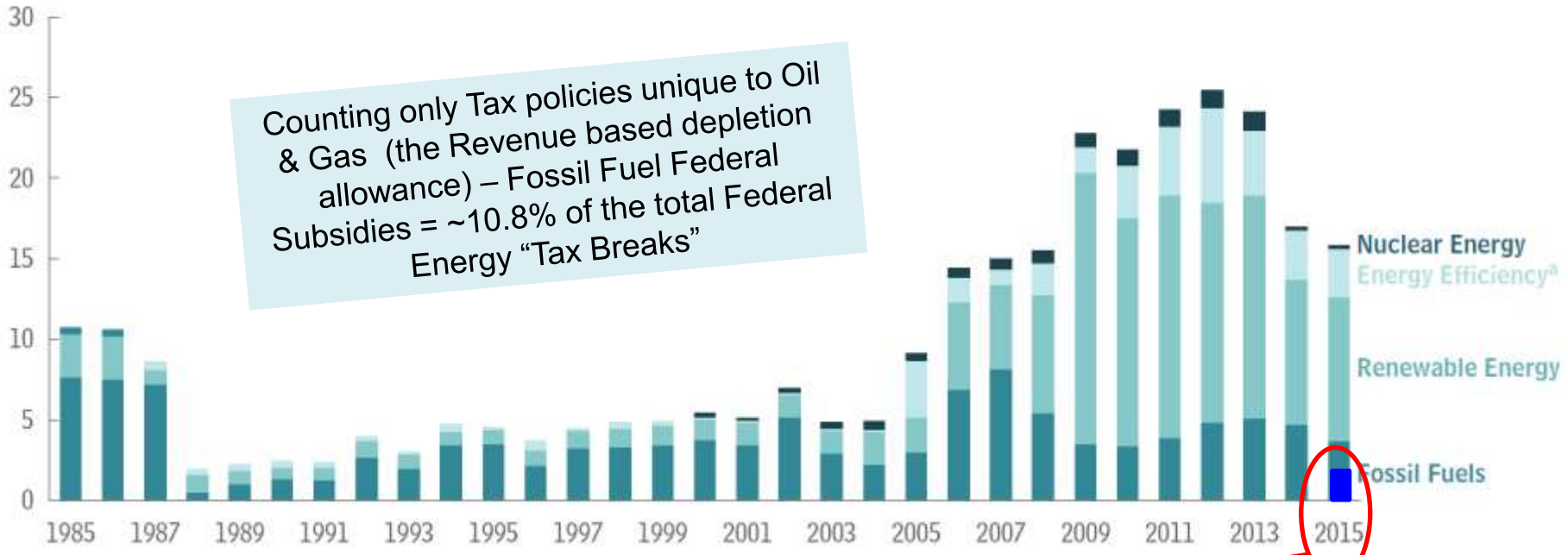


Source: EIA

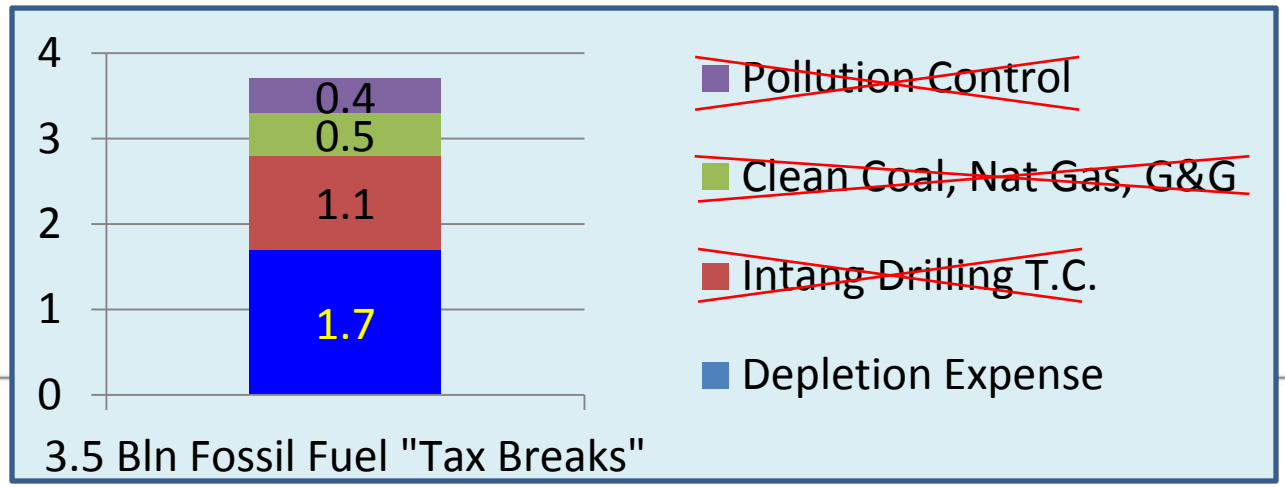
Federal Energy "Tax Breaks"

Costs of Energy-Related Tax Preferences, by Type of Fuel or Technology, 1985 to 2015

Billions of 2015 Dollars



Counting only Tax policies unique to Oil & Gas (the Revenue based depletion allowance) – Fossil Fuel Federal Subsidies = ~10.8% of the total Federal Energy "Tax Breaks"



Let's Look at the Calif – Electric Vehicle CO_2 & $ "Budget"

If we use more electricity in our cars where will those electrons come from?

- Import more coal - Y
- More Nat Gas - Y
- More renewables - ~OK

How much CO_2 will be generated to get those electrons (KWHrs) to my house or charging station? (IPCC & EIA)

Do I trade in my 35 MPG Accord for a Tesla Model 3 in Calif. to reduce CO2?

Info from Tesla Website, My Tesla Model 3 needs 16.6 KWH of electricity to go 50 miles.

To get that 16.6 KWH in Ca 21.6 Lbs of CO2 will be produced.

California Electricity Sources

Fuel Type	Ca In-State Gen (GWh)	% of Ca In-State Gen	Imported	Ca Energy Mix (GWh)	Ca Power Mix	Growth? Yes / No	Used for Future Elec Vech?	Lbs CO2/ KWH	9% Incl Trans Loss	Wgtd Avg Lbs CO2 / KWH
Coal (HC)	324	0.2%	11,683	12,006	4.1%	Yes*	4.1%	3.03	3.31	0.170
Large Hydro	24,410	12.3%	5,271	29,681	10.2%	No				
Natural Gas (HC)	98,831	49.9%	7,161	105,992	36.5%	Yes	36.5%	1.21	1.32	0.598
Nuclear	18,931	9.6%	7,739	26,670	9.2%	No				
Oil (HC)	37	0.0%	0	37	0.0%	No		2.38		
Other - Petroleum (HC)	394	0.2%	0	394	0.1%	No		2.38		
Renewables	55,300	27.9%	18,662	73,961	25.5%					
Biomass	5,868	3.0%	684	6,553	2.3%	Yes	2.3%	2.74	2.99	0.084
Geothermal	11,582	5.8%	1,134	12,717	4.4%	Yes	4.4%	0.14	0.15	0.008
Small Hydro	4,567	2.3%	230	4,796	1.7%	Yes	1.7%	0.09	0.10	0.002
Solar	19,783	10.0%	3,791	23,574	8.1%	Yes	8.1%	0.15	0.17	0.017
Wind	13,500	6.8%	12,822	26,321	9.1%	Yes	9.1%	0.04	0.05	0.005
Unspec Grid Sources (HC)	N/A	N/A	41,825	41,825	14.4%	Yes	14.4%	2.12	2.32	0.414
Total	198,227		32%	290,567	100.0%		80.5%			**1.299**

Raw Data Source: US EIA Annual Energy Review 2016

The electricity that comes out of the wall in Ca adds 1.3 lbs of CO2 per KWH?

California

Miles Traveled	Tesla 3 Charge Time (Hrs)	Tesla 3 "Fuel" kWh	**1.3** Lbs CO2 Per KWH	Gasoline 35 MPG 19.6 PPG	% Less CO2
50	1.7	16.6	21.6	28.0	29%
100	3.5	33.3	43.3	56.0	29%
150	5.2	49.9	64.9	84.0	29%
200	6.9	66.6	86.5	112.0	29%
250	8.7	83.2	108.2	140.0	29%
300	10.4	99.8	129.8	168.0	29%

@ 60 MPH Charge time = 2x Drive Time

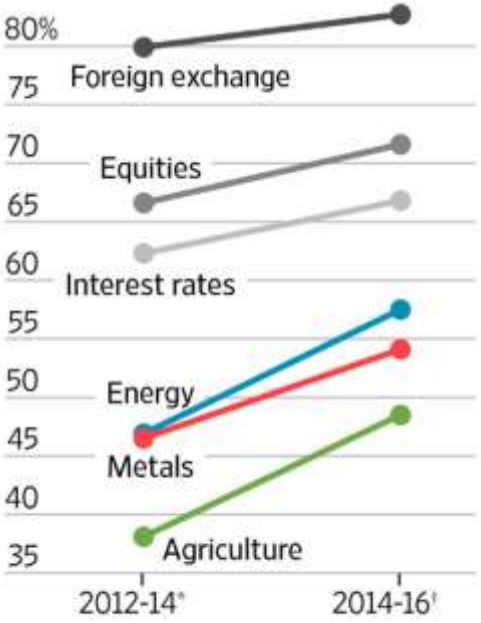
If I can get 35 MPG in my Honda Accord I will use 1.4 gal of gas and put 28 lbs of CO2 into the air.

If I live in Ca and I want to reduce CO_2 then…..yes ….I trade in my Honda for a Tesla If I have the time and the $$.

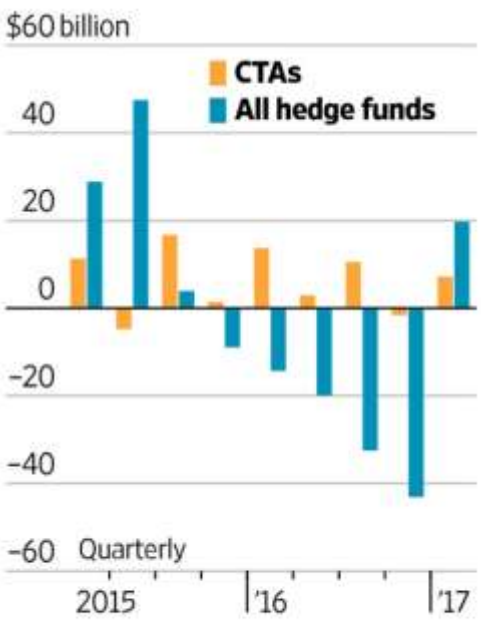
Computerized Commodities

Automated trading is becoming more popular in markets like energy, metals and agriculture. That's helping fuel investments into commodity trading advisors (CTAs), hedge funds that often use computer programs to bet on market trends.

Share of futures trading that is automated



Investment flows



*November 2012 to October 2014 †November 2014 to October 2016

Sources: CFTC (share); Preqin (investment flows)

THE WALL STREET JOURNAL.

EVs Vs MVs

- Disclaimer: I am a Space x and Tesla fan. Unlike normally funded government programs, Elon Musk has demonstrated that you can run a company entirely on government subsidies and actually produce something useful (but not for profit).
- Myth: Electric vehicles will overtake the motor vehicle market by 2030
- Truth: Data suggests that EVs are not yet competitive. We will use Tesla information because they are truly the EV market leader.
- Using Telsa's website: https://www.tesla.com/charging. We can develop a table to more easily understand what the Model 3 claims, I adjusted a few variables to make this work for a 2017 Honda Accord Comparison

NEMA 14-150		$/kWh	mpg	$/gal
9.6kW		0.12	27	2.34
	Charge			
Miles Traveled	Time (min)	kWh	eCost	gCost
50	104	16.64	$ 2.00	$ 4.33
100	208	33.28	$ 3.99	$ 8.67
150	312	49.92	$ 5.99	$ 13.00
200	416	66.56	$ 7.99	$ 17.33
250	520	83.2	$ 9.98	$ 21.67
300	624	99.84	$ 11.98	$ 26.00

EVs Vs MVs

- At a first glance the data looks great! Tesla will save the average car driver at least 50% in energy cost!

- Lets take a look at life cycle cost. Side by side lowest Model 3 base vs Honda Accord base:

2017 Honda Accord Sedan			Tesla Model 3	
MSRP	$ 22,500.00		MSRP	$ 35,000.00
mpg City	27		mpg City eq	59
Range miles	459		Range miles	200
Fill up time	15 min /4 59 mile		Charge time	2 min / mile

- mpg equivalence was calculated as follows:

  (mpg Honda Accord)*(gCost/eCost)

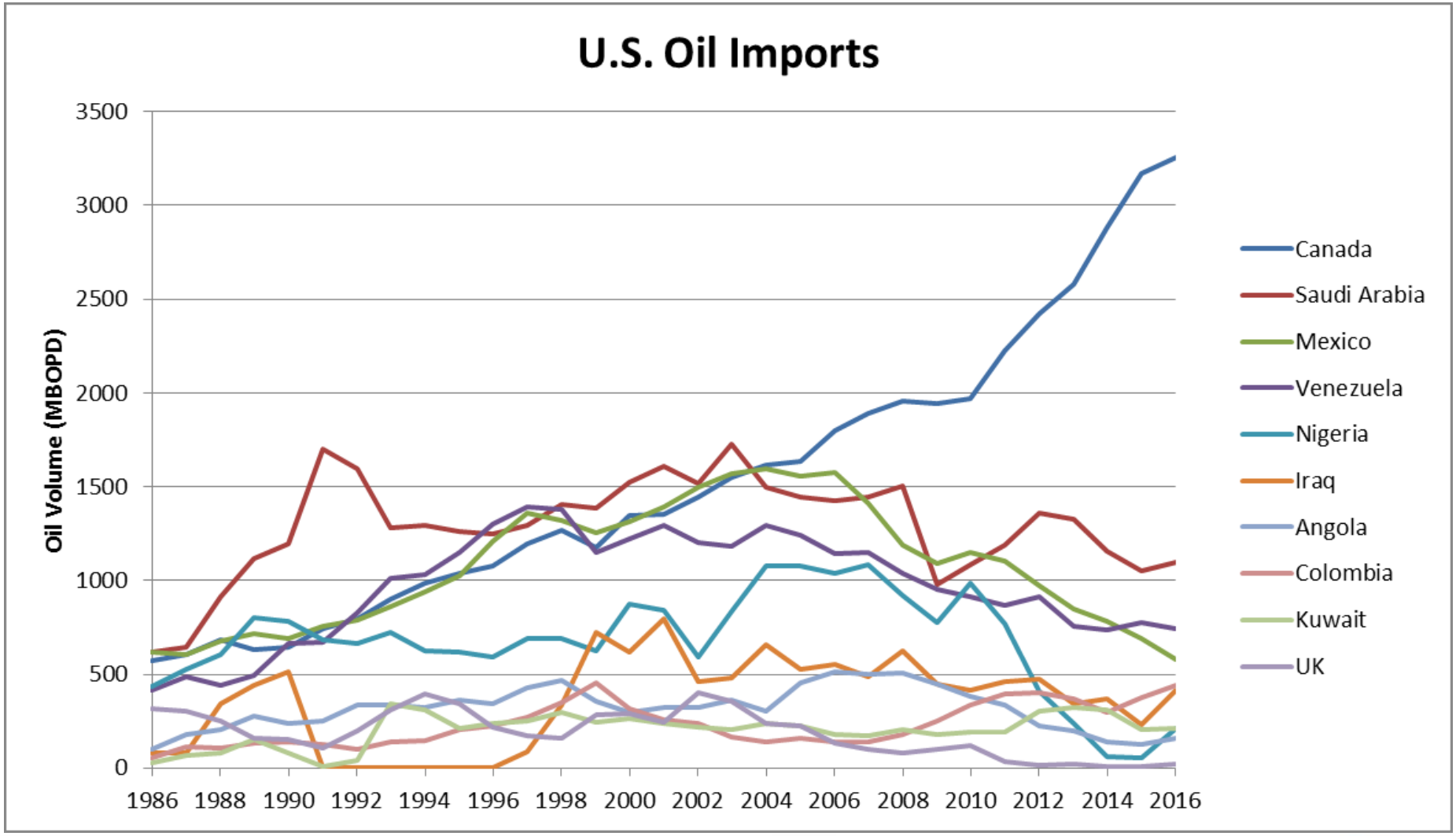
- Now we can do a NPV equivalence based solely on mileage. How many miles do I have to drive to a Tesla Model 3 to actually save money assuming I pay for either vehicle in full on day 1? Using an interest rate of 4% APR and driving an average of 88 miles a day or 30,000 miles per year.

362,500 miles before I Break Even

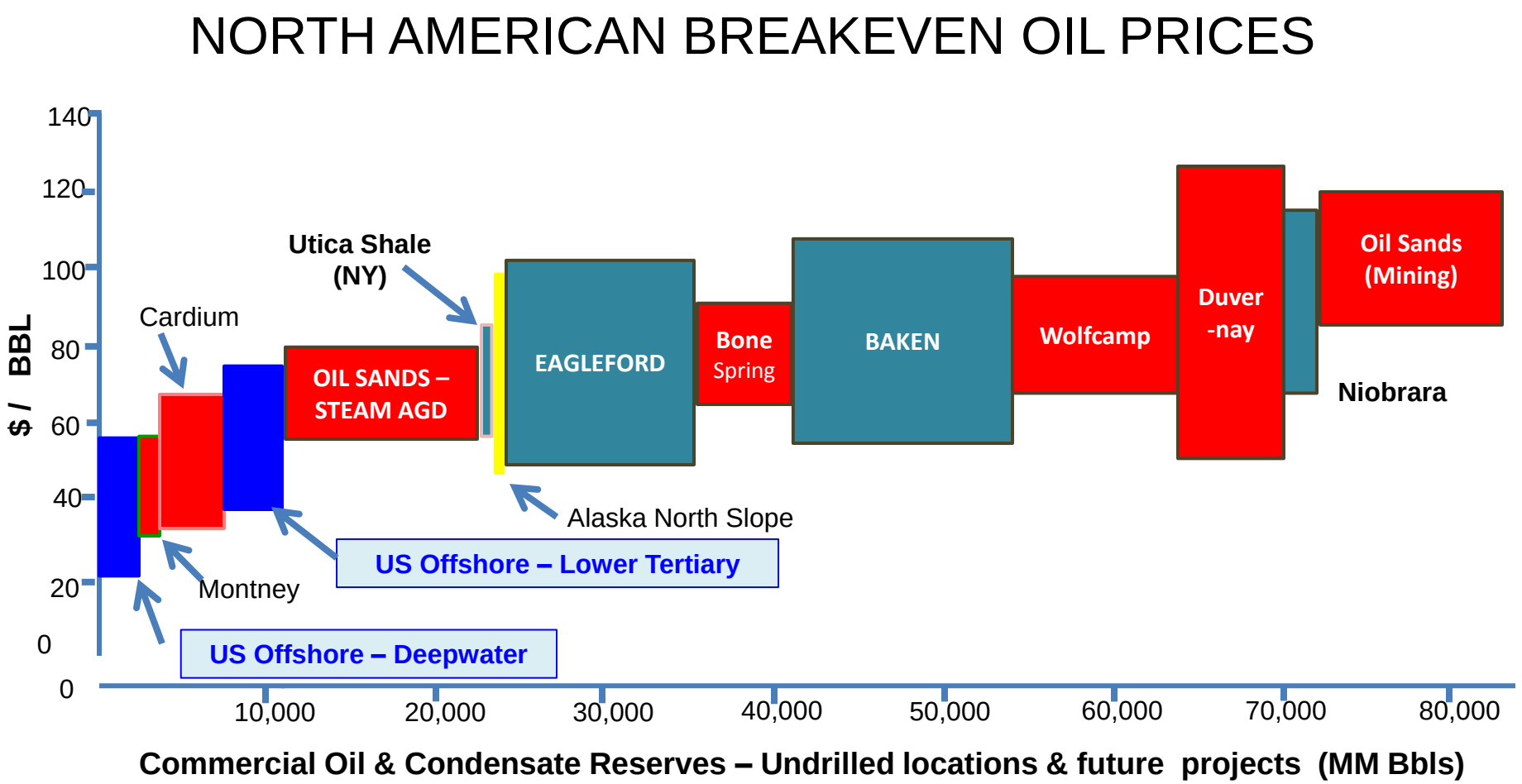
EVs Vs MVs

- Ok so I lose money. The Tesla is still cool and I still want one. Lets look at other stats:
- The base model S will take me 7 hours to charge from a full drain on my normal house charger. I could upgrade to the $45,000 model and get 300 miles per charge but that will take 10 hours.
- Supercharging stations exist in my state. This will come in handy, 30 minutes for 170 miles! Great improvement.
- Supercharging station density: 6 in Louisiana.
- There are at least 6 gas stations within 2 miles of my house. And I can get a beer there. I wish I had auto pilot but I can wait 2 miles to open it.

US Oil Import Trends

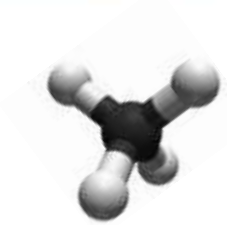


DW Gulf of Mexico – The most profitable play in N America

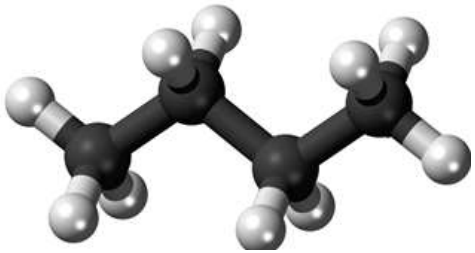


Deepwater is the most competitive in terms of profitability, but as per Wood MacKenzie is not as large as other opportunities. **True or False?**

Hydrocarbon Basics & the Value of US Light "Crudes"

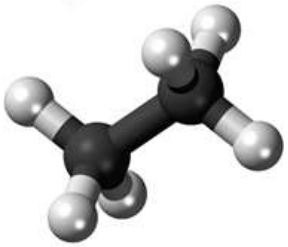


Methane CH_4

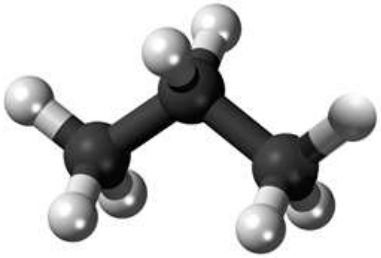


Butane C_4H_{10}

"Crude Oil" is a crude mixture of hydrocarbon chains from Methane (1) to Tetraoctane (40)



Ethane
C_2H_6



Propane
C_3H_8

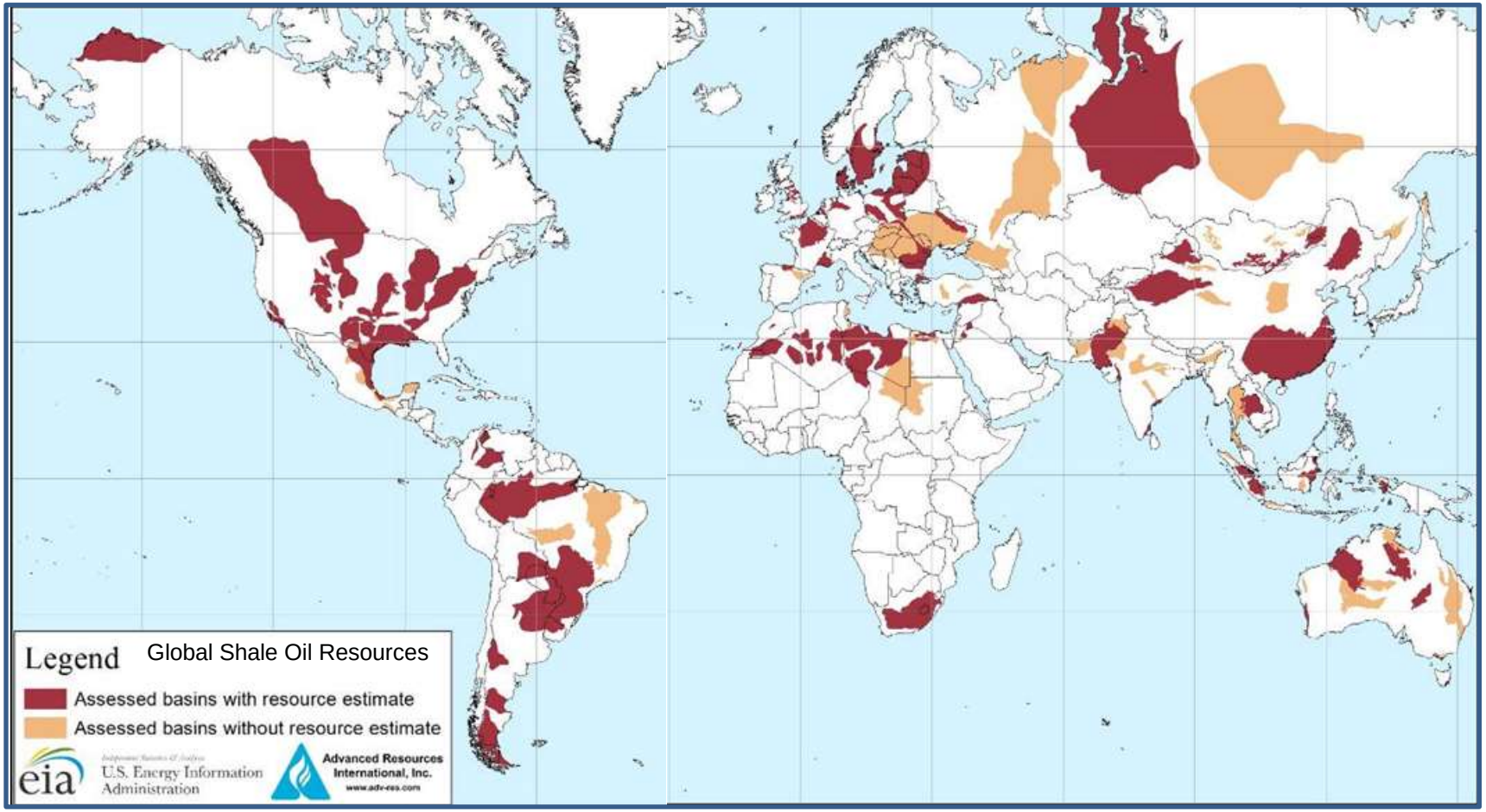
Pentane C_5H_{12}

Light weight Crudes and Condensates are blended with Heavy Crudes for ease of transport, refining yields and overall utility of the final oil mixture.

US Crudes from the GOM along with condensates and the very light "Shale Oils" are ideal for blending with heavy crudes in Canada and S America..

LLOG exploration

What if…..the rest of the world starts Fracking?



- Potential US “dominance” in oil would be mitigated by similar shale oil developments on a global basis.
- Possible – Yes. Likely - No

Why the USA is the Fracking leader and is likely to continue.

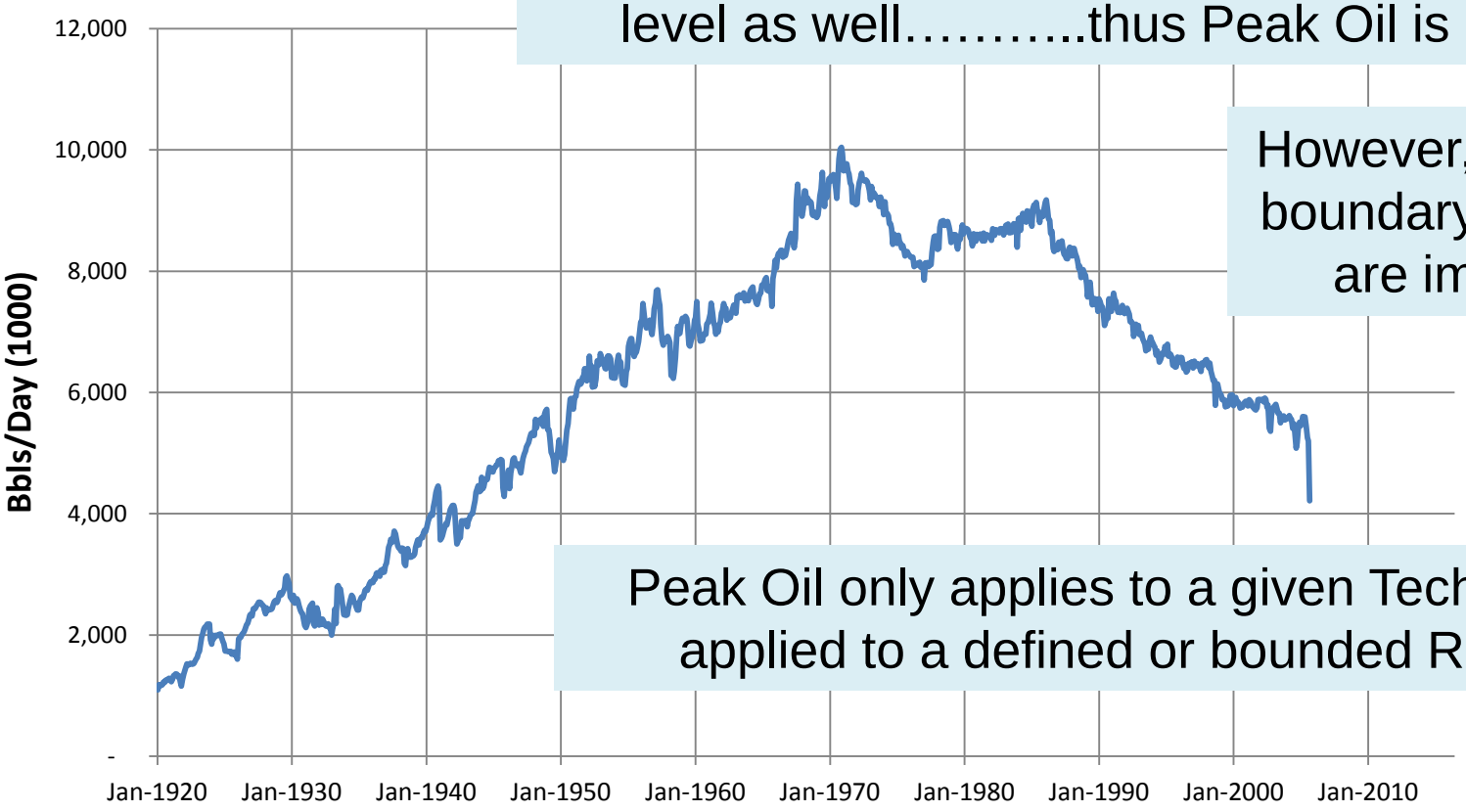
- The USA mineral rights/ownership model is unique in the world. In virtually all countries around the world, the owner of the surface land – be it a house or farmland – has absolutely no rights with regards to mineral ownership.
- Not so in the US – Land Ownership – 61% of US Land & Minerals are privately held and the landowner/mineral rights owner owns the minerals. The individual shares in the financial returns associated with oil and gas development.
- Canada has equally impressive shale oil/gas resources, however only 9% of the Canadian mineral rights are privately held.
- With little to no financial incentive to deal with the temporary surface impacts associated with drilling and production outside the US, there is also relatively little global support for fracking and oil and gas development.
- The mineral rights structure in the US supports a diverse range of oil and gas companies that work in competitive as well as a complimentary modes. Outside the US the oil and gas industry is dominated almost entirely by large corporations and national oil companies.
- The end result is the US enjoys the most diverse, efficient and safe oil and gas industry in the world.
- Rotary drilling on land & offshore drilling started and remain to a large degree US based*. The Fracking revolution will follow the same US led path.

Thus, a reserves position based on onshore fracking is likely to remain a globally competitive advantage for the US.

FINALLY - Peak Oil – FACT or FICTION?

Peak oil, an event based on M. King Hubbert's theory, is the point in time when the maximum rate of extraction of petroleum is reached, after which it is expected to enter terminal decline. **Peak oil** theory is based on the observed rise, **peak**, fall, and depletion of aggregate production rate in **oil** fields over time.

The physics on a "field level" , works on a global level as well…….thus Peak Oil is a FACT.

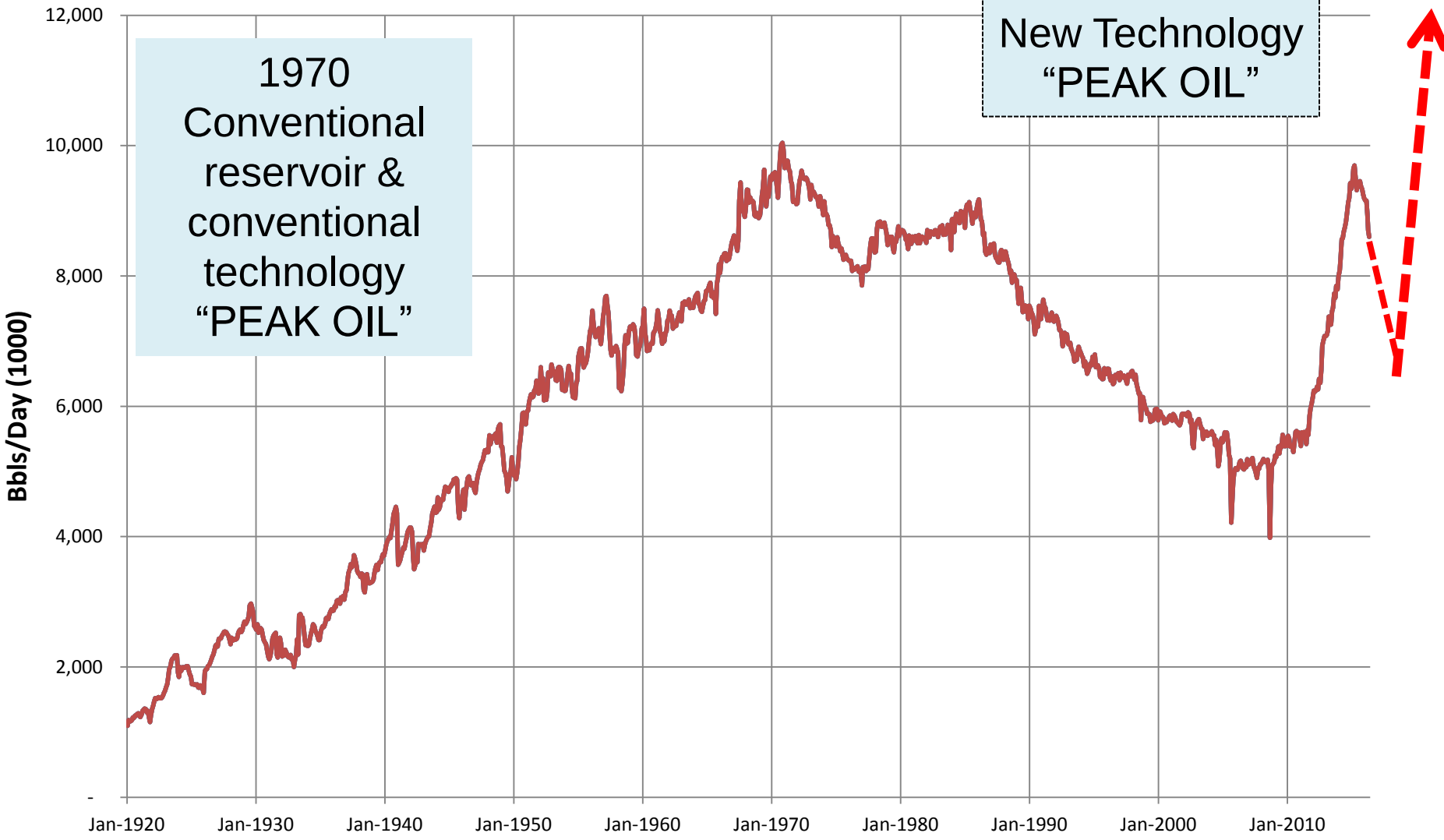


However, in physics, boundary conditions are important.

Peak Oil only applies to a given Technology set applied to a defined or bounded Resource.

LLOG exploration

Peak Oil – FACT or FICTION?



‘NEW Technology” PEAK OIL

“We can only drill for what we can see, we can only produce what we can get to flow.”

Once we have maximized both we will then truly reach PEAK OIL.

What can we see? – as deep and as far as the seismic will allow – which is always changing.

What can we drill for?

With rotary steerable computerized drilling tools and fully robotic state of the art rigs we can drill what we can see – to 40,000’. We can drill to the full range of the oil provinces in the earth.

What can we produce – with fracking technology we can produce significant oil from a range of resources, onshore and offshore.

ADD it all up and you have…..a different future.

Independence Day II

Home | News & Analysis | Latest News Headlines

S&P Global
Platts

US holds more oil reserves than Saudi Arabia, Venezuela, new study shows

London (Platts)--4 Jul 2016 1224 pm EDT/1624 GMT

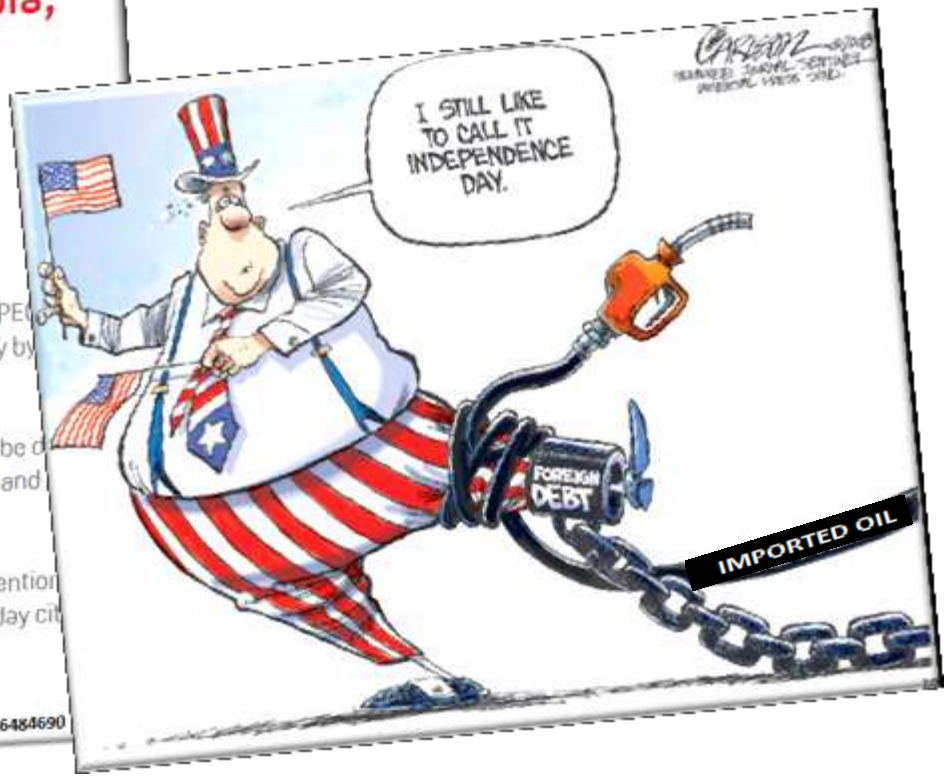
- Rystad study includes yet to find oil
- Global reserves stand at 2.09 trillion barrels
- Venezuela reserves well below official data

The US holds the world's biggest recoverable reserves of oil putting it ahead of OPE
Saudi Arabia and Venezuela as well as Russia, according to an independent study by
Norwegian research group Rystad Energy.

In estimates which include potential reserves in recent discoveries and in yet to be d
fields, US reserves total 264 billion barrels, ahead of 256 billion barrels in Russia and
barrels in Saudi Arabia.

For the US, more than half of the remaining oil reserves are made up of unconventio
oil with Texas alone holding over 60 billion barrels of shale oil, Rystad said Monday ci
new data.
Article Continues below ...

http://www.platts.com/latest-news/oil/london/us-holds-more-oil-reserves-than-saudi-arabia-26484690

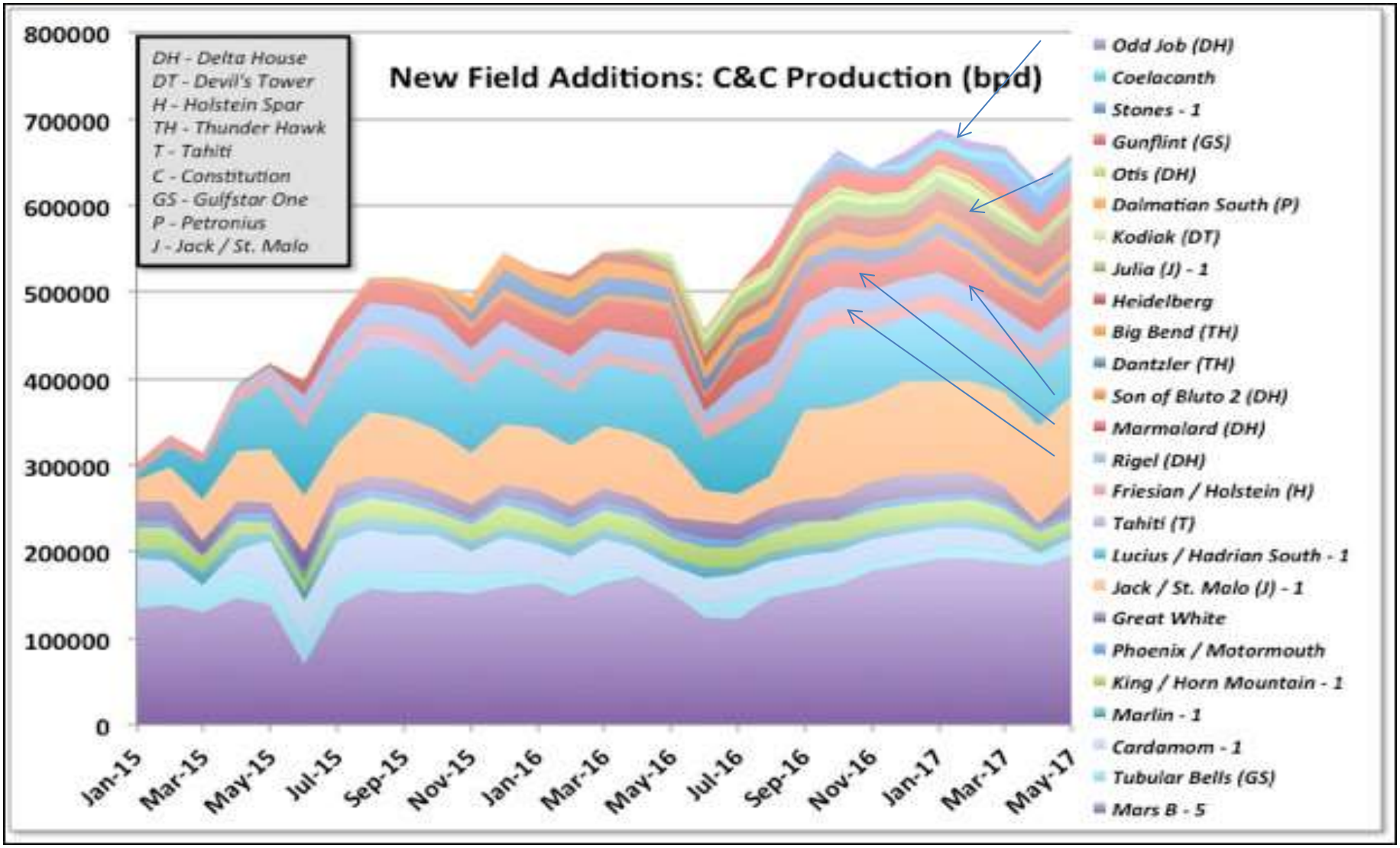


As a nation we can

- be energy independent…
- reduce cash flow to hostile regions…..
- provide Increased job and career opportunity for our youth…..
- resulting in……...

LLOG exploration

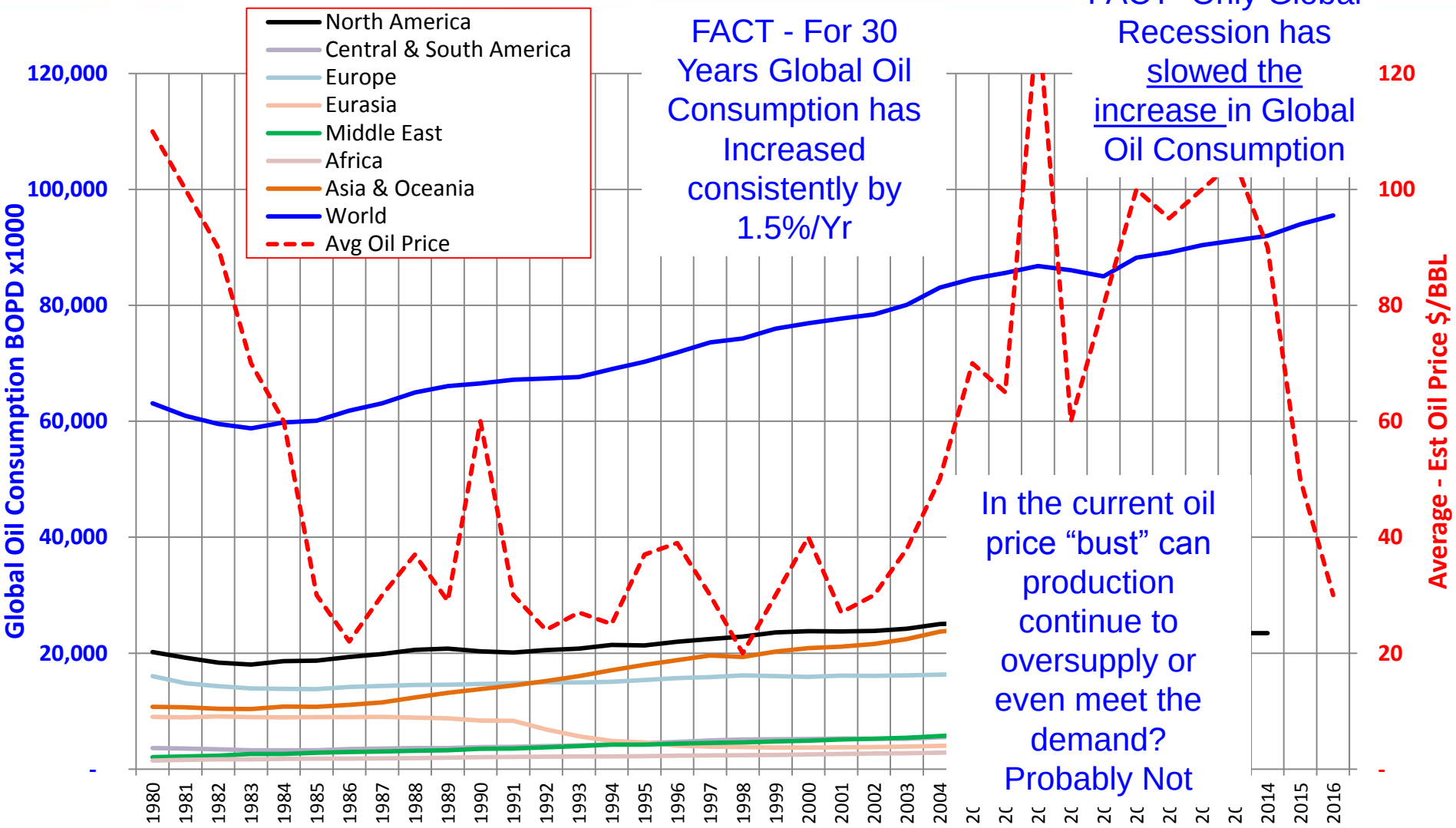
GOM "New" Field Production Trends



http://oilprice.com/Energy/Energy-General/Has-Gulf-Of-Mexico-Production-Peaked.html

LLOG exploration

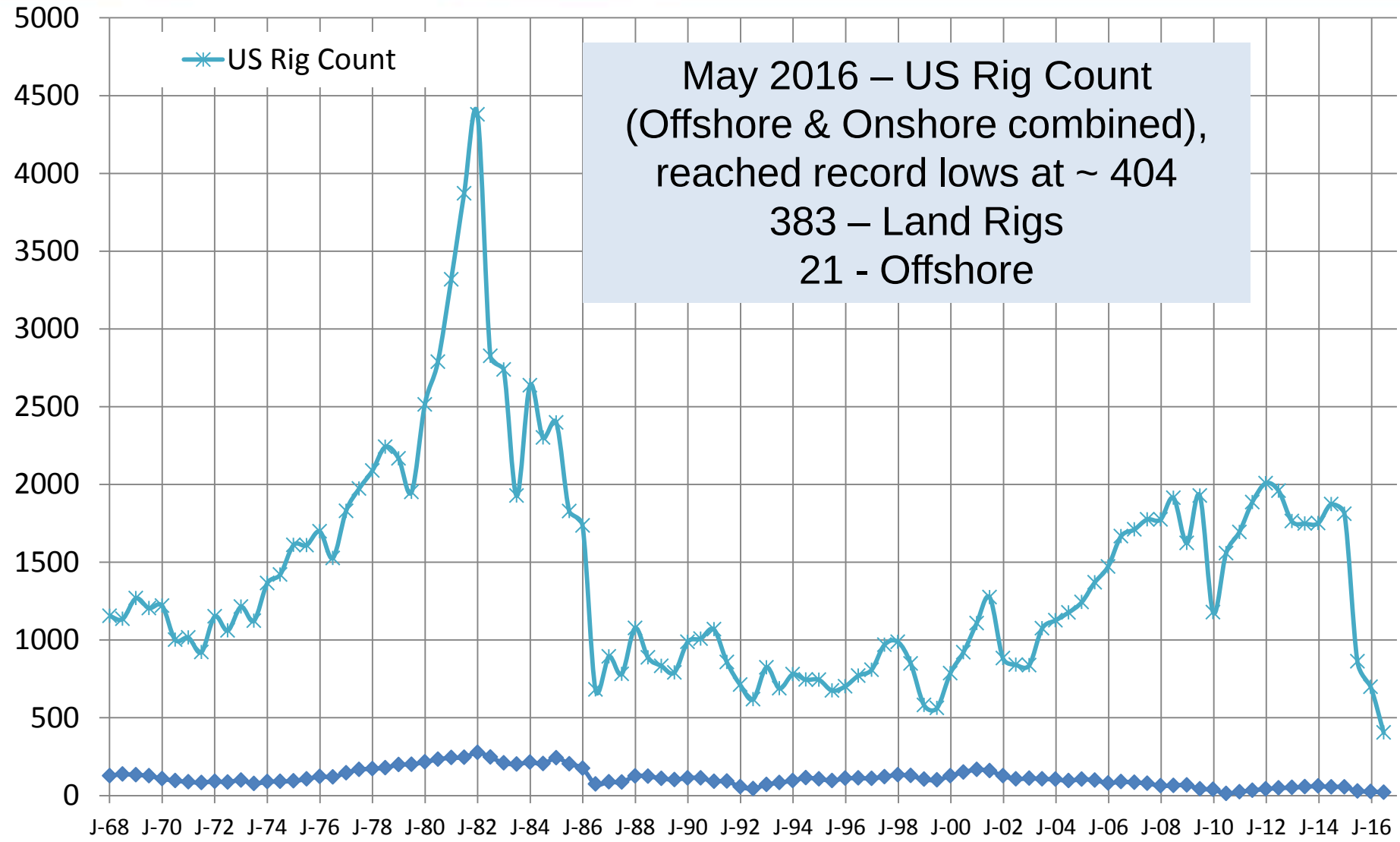
Global Oil - Consumption & Prices 1980 - 2016



Whether you use a Time Weighted Avg Oil Price, or a Global Demand "Eyeball" Average Oil Prices over the long term should average $50-$70 $/Bbl

exploration

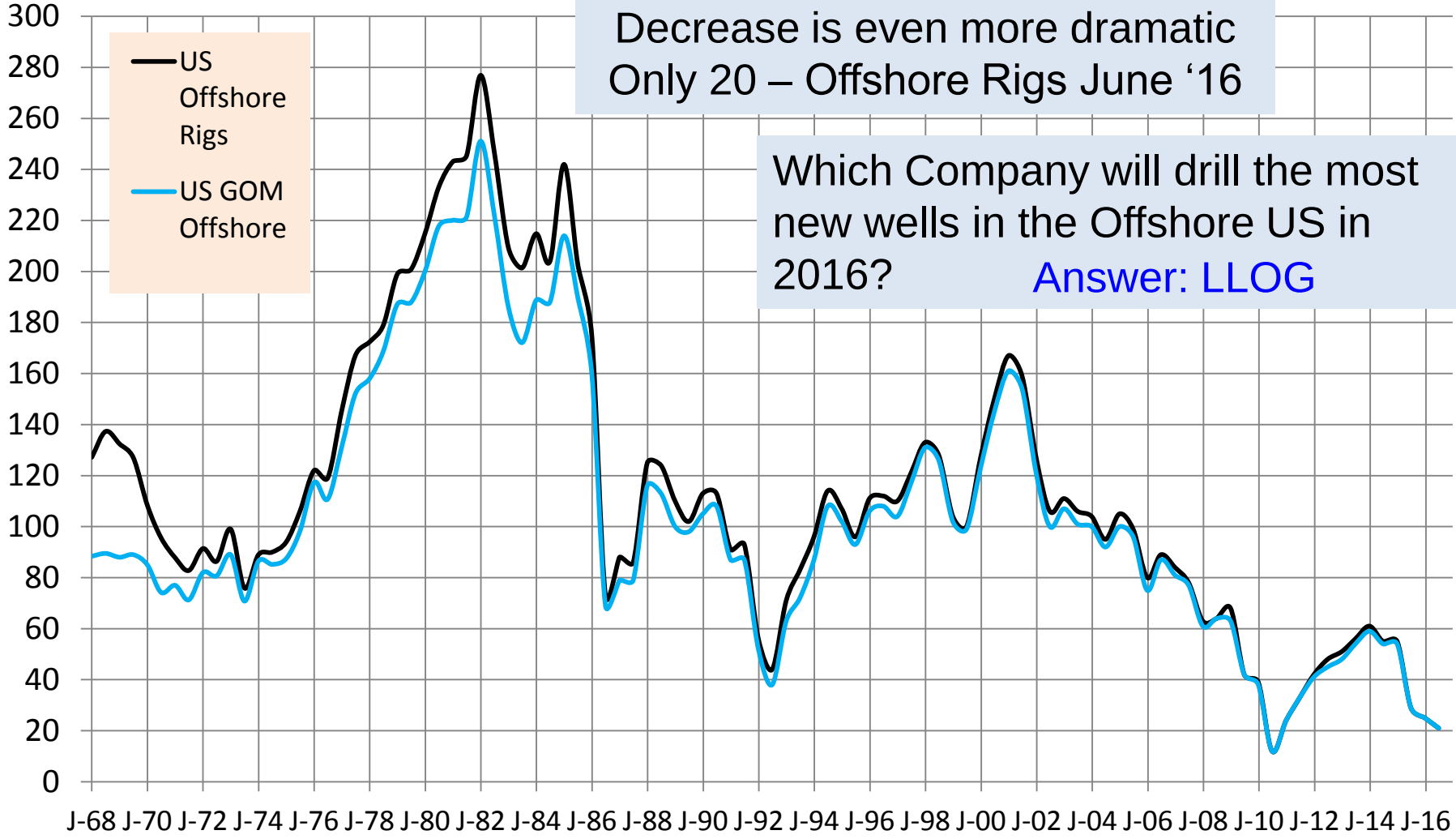
Current Bust Impact; 2106 Rig Count Lowest in History = ???



US Offshore Rigs…Same Story…Lowest rig count in History

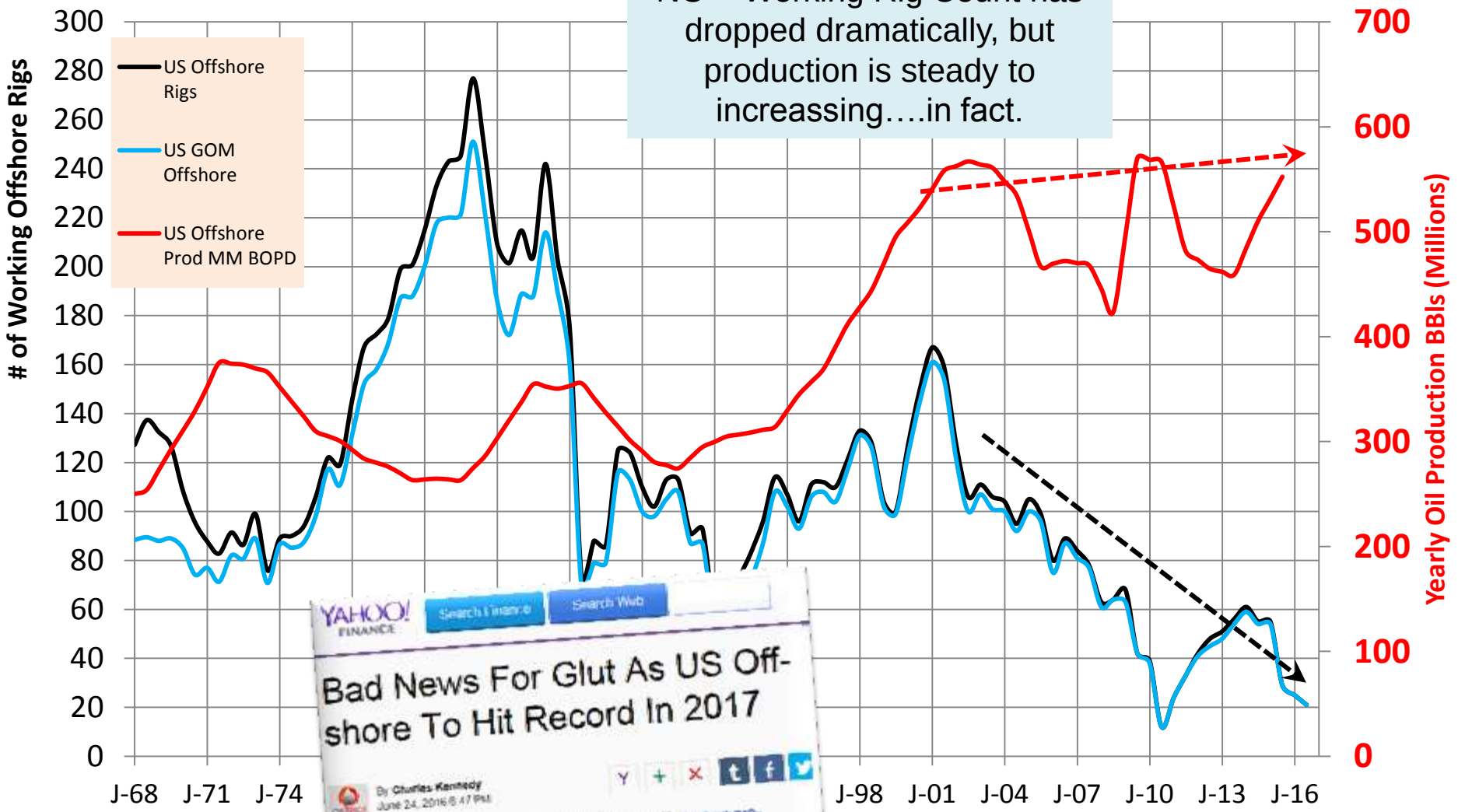
Offshore the Active Rig Count Decrease is even more dramatic Only 20 – Offshore Rigs June ‘16

Which Company will drill the most new wells in the Offshore US in 2016? Answer: LLOG



US Offshore Rigs vs Production – Do we see the same trend?

NO – Working Rig Count has dropped dramatically, but production is steady to increassing….in fact.




YAHOO! FINANCE

Bad News For Glut As US Offshore To Hit Record In 2017

By Charles Kennedy
June 24, 2016 6:47 PM

Companies pumping oil from the Gulf of Mexico will ramp up production in coming months, propping up American output, despite efforts to curb production and raise barrel prices.