US & World Economic Review

Technology Outlook

Energy Proppant & Supply & Demand Outlook

May 2017

248 Bryn Mawr, Suite 1 *Houston, TX 77024*
Direct: 713-818-9298 *Fax: 832-767-6764*

www.pathfinderone.com

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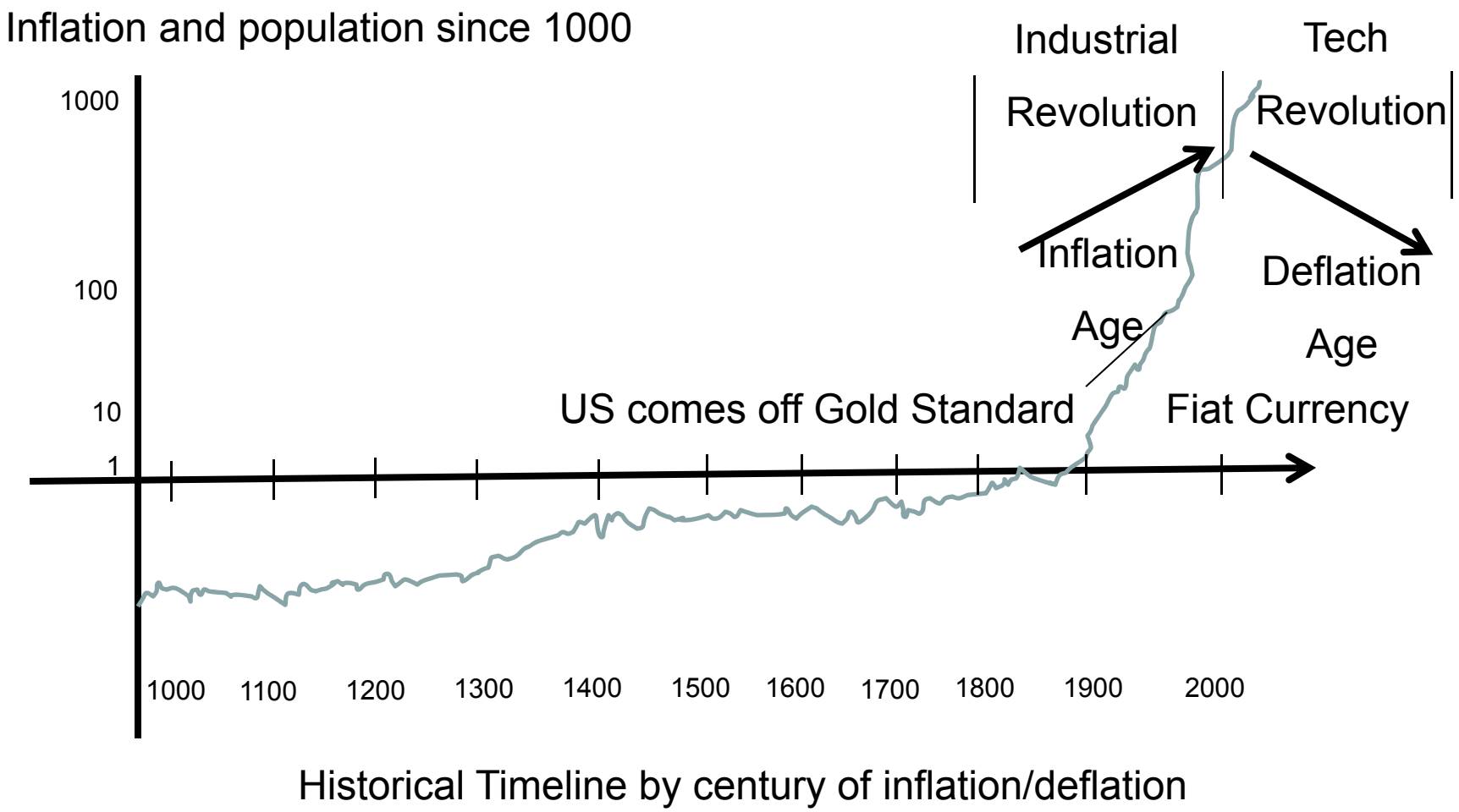
2017 Strategy

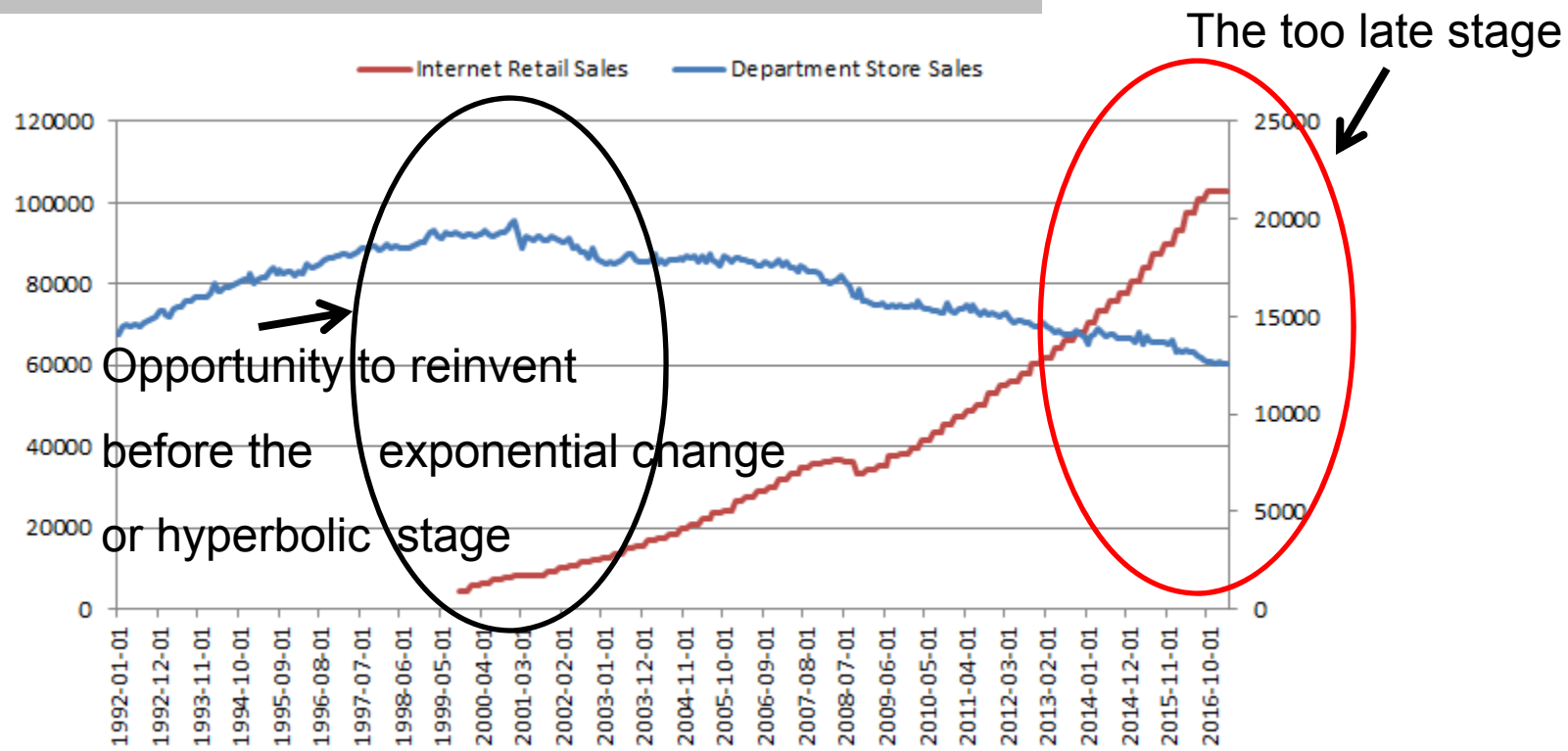
A Journey Into the Future

2017 Strategy



2017 Strategy

That was then, this is now



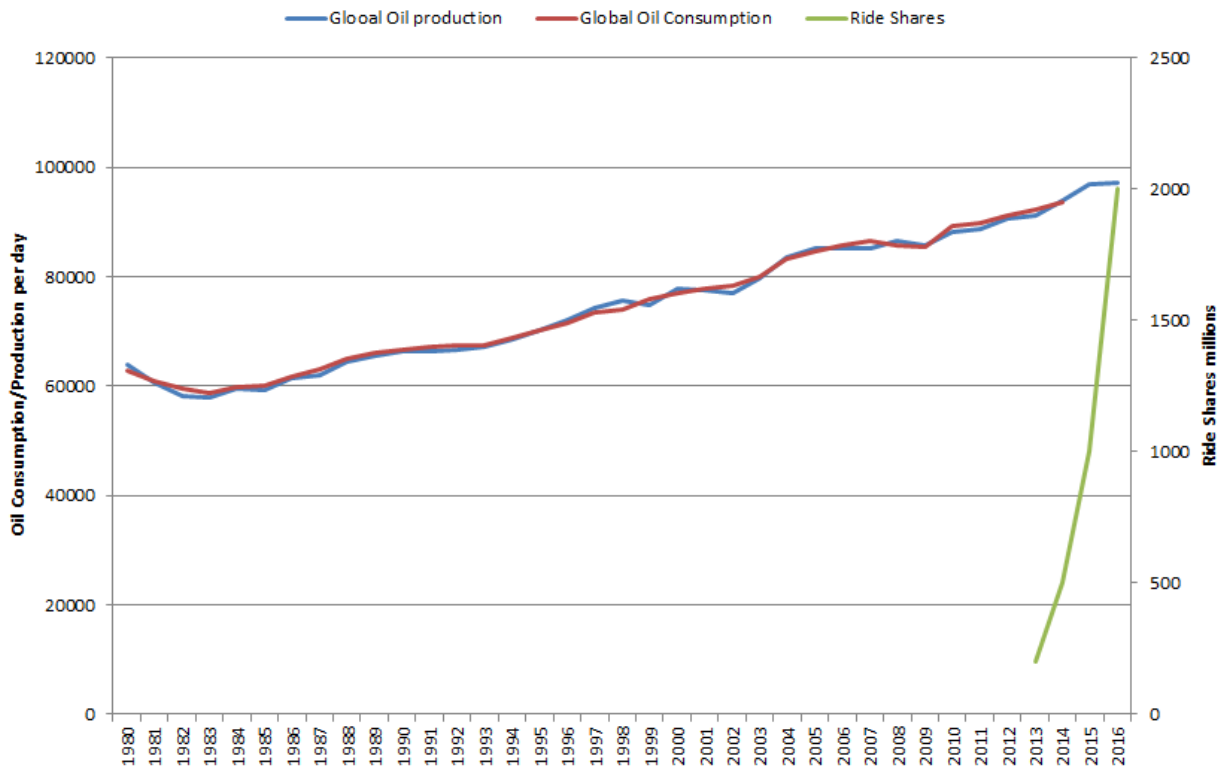
2017 Strategy

It took the internet 10 years to reach 1 billions users

Uber to 2 years to accomplish 1 billion rides and one more year to capture another billion

2017 Strategy

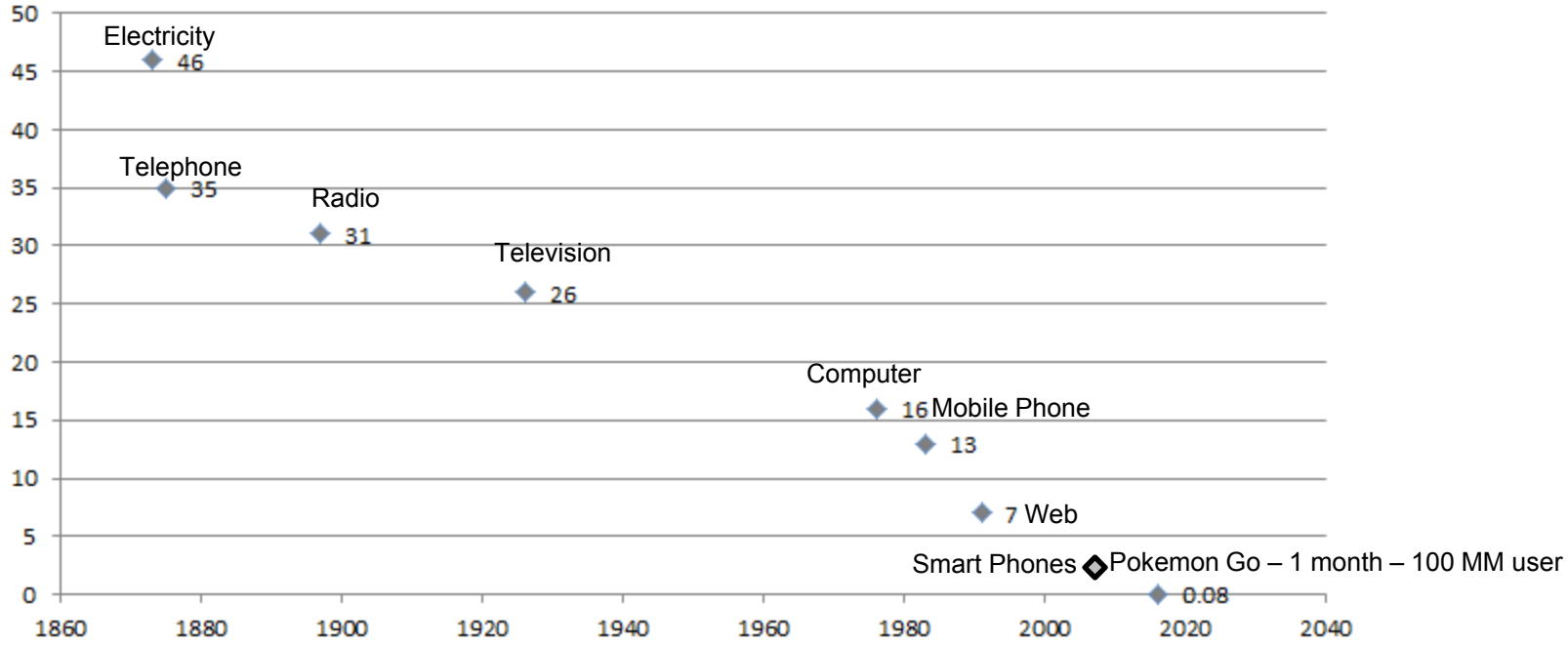
Ride Shares are like Internet in 2000 against retailers



2017 Economy

How many years did it take for an invention to be used by 25% of the American population

◇ Networks have changed everything



2017 Strategy

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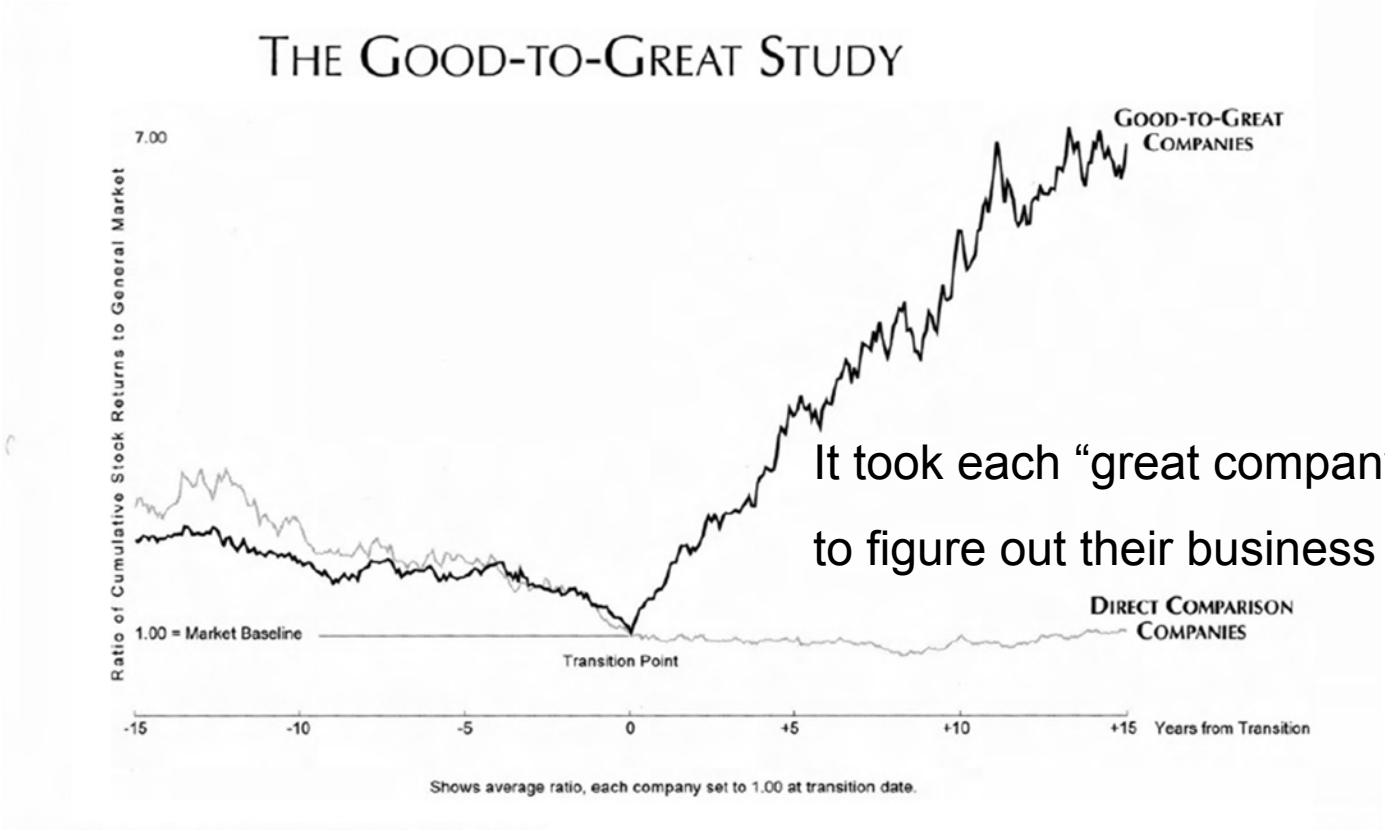


It took each “great company” 15 years to figure out their business

2017 Strategy

Good to Great Principles - Three Stages of Breakthrough

- Disciplined People
  - Level 5 leader
  - Right people on bus, first who then what
- Disciplined Thought
  - Confront the brutal facts
  - Hedgehog concept
- Disciplined Action
  - Culture of Discipline
  - Technology accelerators

2017 Economy

Fortune 1000 over the past 40 years

1975 - 1985

- 30% had fallen off the list

1985 - 2015

- 70% had fallen off the list

Speed Doubles

Fortune 1000 over the next 20 years

2015 - 2035

- 70% will fall off the list

2017 Strategy

US Demand Disruptions

Ride Share / Autonomous Cars

◇ 60% 5.66

Food / Oil Demand on Trucks

◇ 25% 0.9525

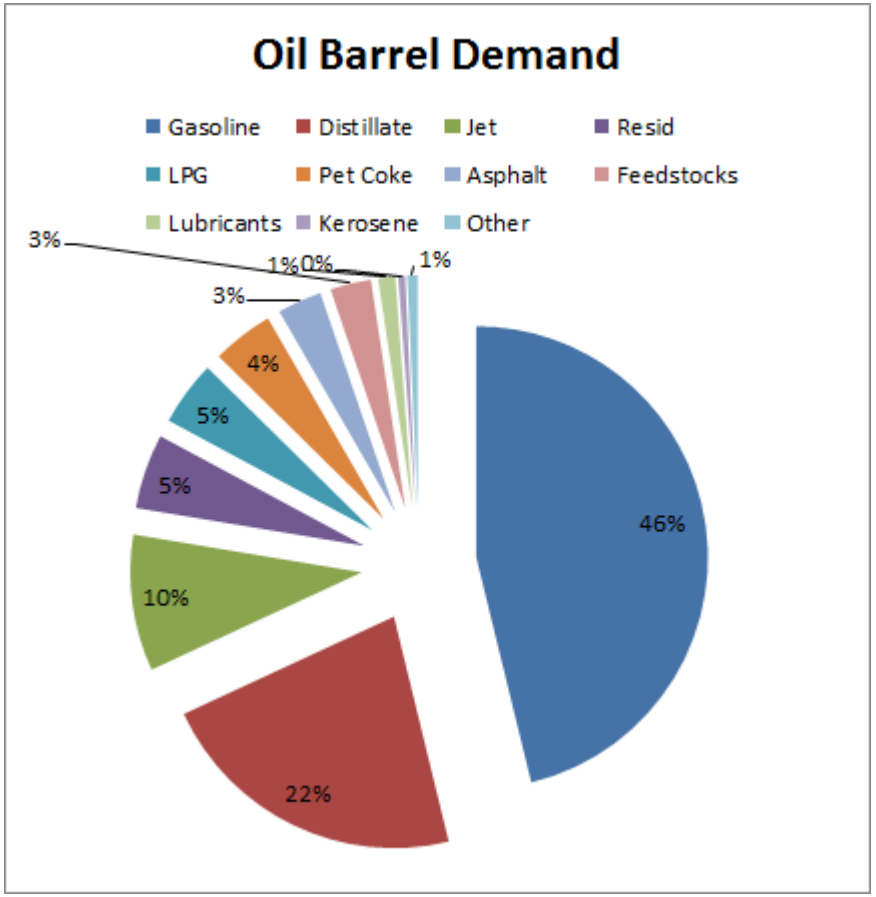
Naphtha Demand – Plastics Auto

◇ 50% 0.11

Asphalt Demand – Parking Lots

◇ 50% 0.65

US Demand Loss **7.37**

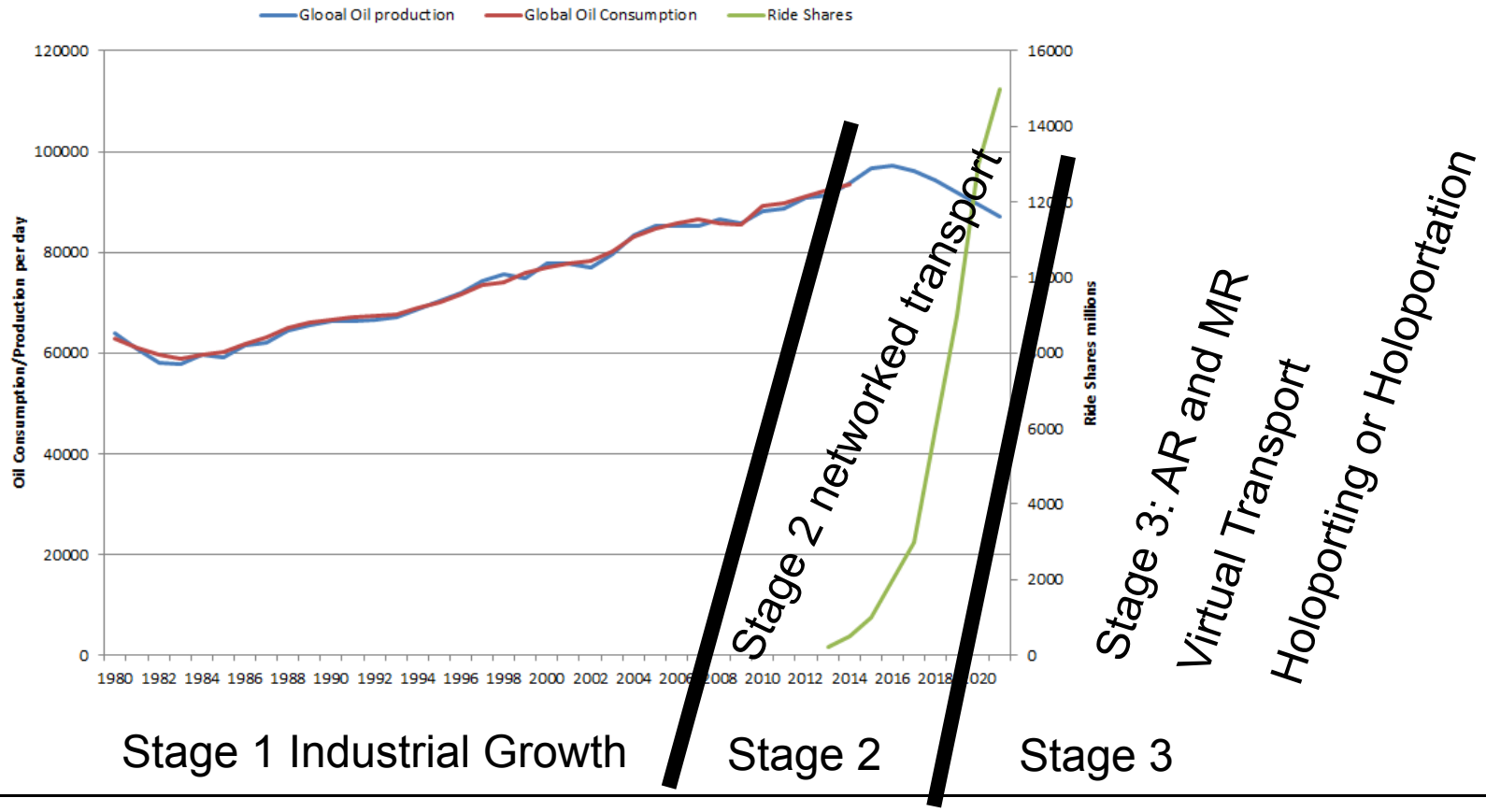


2017 Strategy

Network Economy Brings Abundance of the following:

- Transport Gasoline, Distillate Fuel, Asphalt, Plastics, Rubber, Steel
- Food
- Services
- Commercial and Residential Real Estate

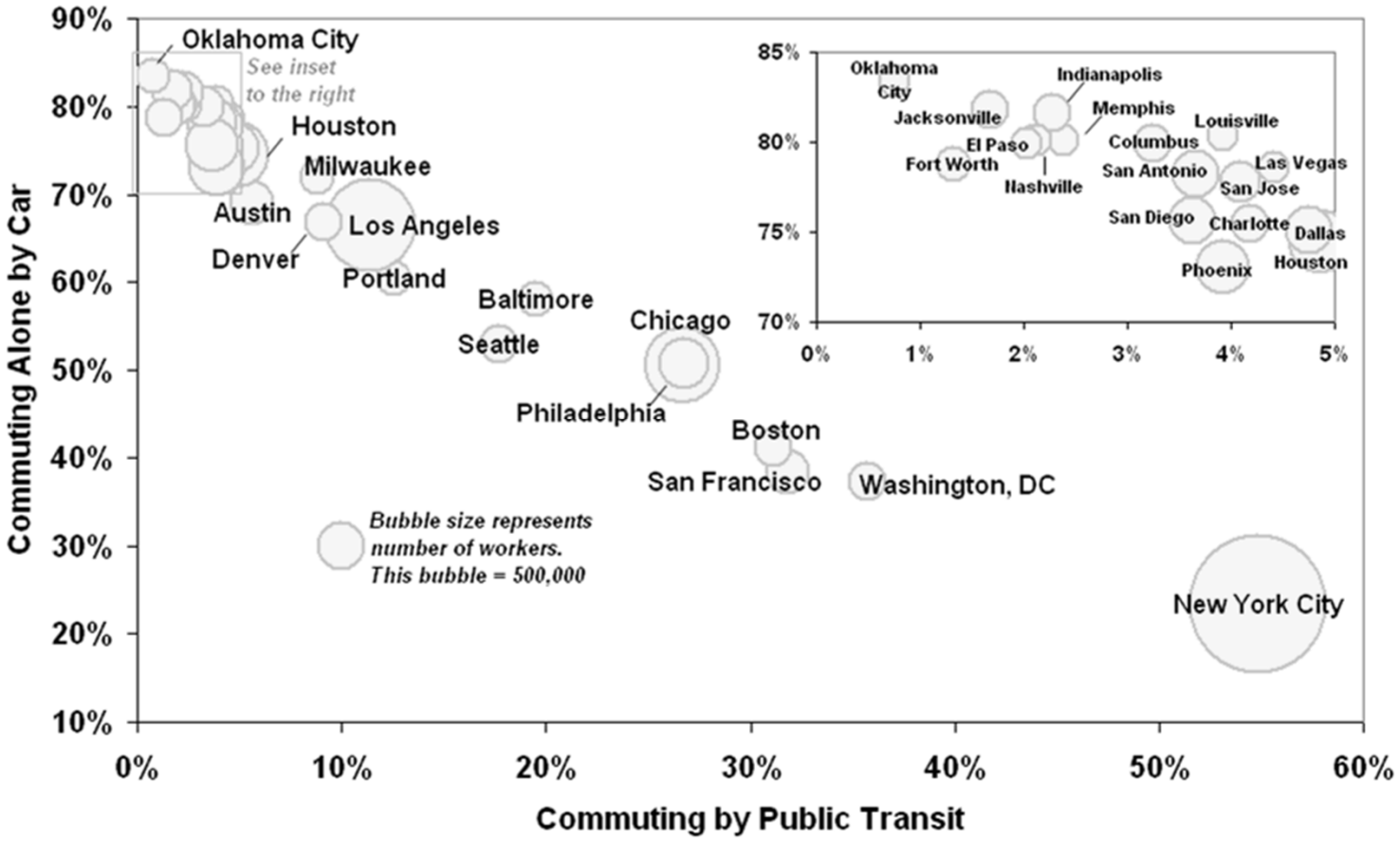
Ride Shares and Oil Demand and Virtual Transport



2017 Economy

The Future is here for the auto industry

Major US City Commute Patterns – Current System



2017 Economy

Autonomous Car Technology

- Google's self driving car project in California and Texas
- Googles Chief Legal Officer was forced off Uber Board for conflict of interest
- Google's self driving fleet will be ready by 2020 with un-named manufacturer
- Google's launches "Waymo" self driving project under Alphabet
- Google's partners with Chrysler in MiniVan ride share service
- Uber completed $680 MM acquisition of Otto the self driving truck company
- Uber completed $300MM JV with Volvo to develop autonomous cars
- Uber secured a strategic investment with Toyota to develop autonomous cars
- Uber states all Uber cars will be driverless by 2030
- Volkswagen invests in a new transport company MOIA to redefine transport
- Ford Targets fully autonomous vehicles by 2021
- GM acquired Side Car as a competitor to Uber and Lyft; 2020 is GM forecast
- Delphi announces self driving system by 2019
- Tesla announces self driving system by 2018

2017 Economy

Autonomous Car Technology – Is it safe?

Media

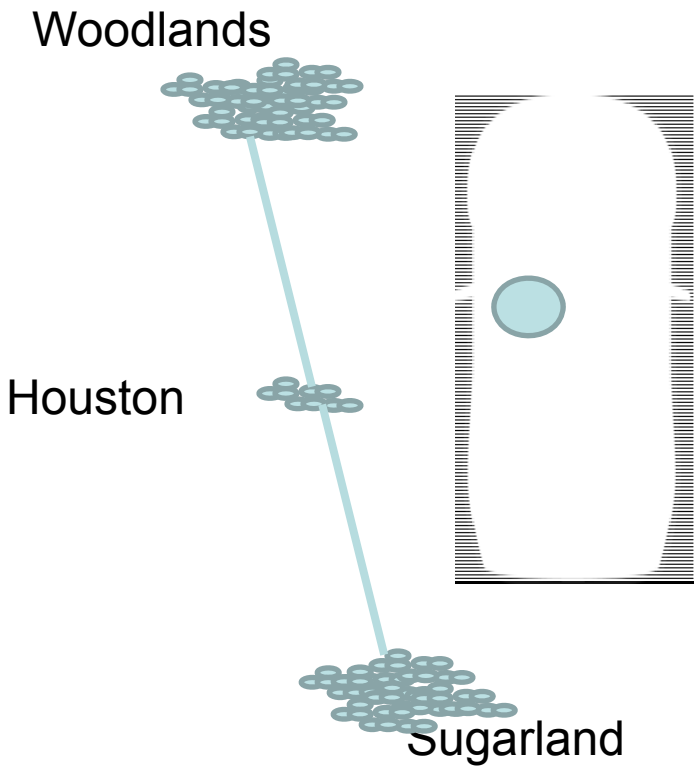
- Tesla has self driving fatality – June 2016

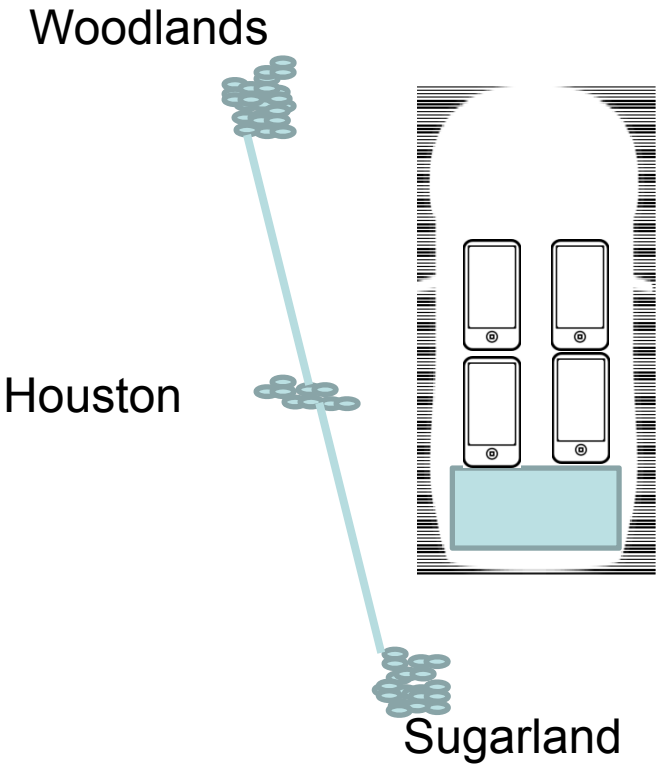
Fact's

- MIT has drones flying 30 – 50 MPH through wooded forest without incident – 15/16
- US auto accident rate is 10% per year; self driving will pull this under 0.5%
- Current 38,300 Auto Fatalities per year will drop significantly
- Current 6,019,000 Auto crashes per year will drop significantly

2017 Economy

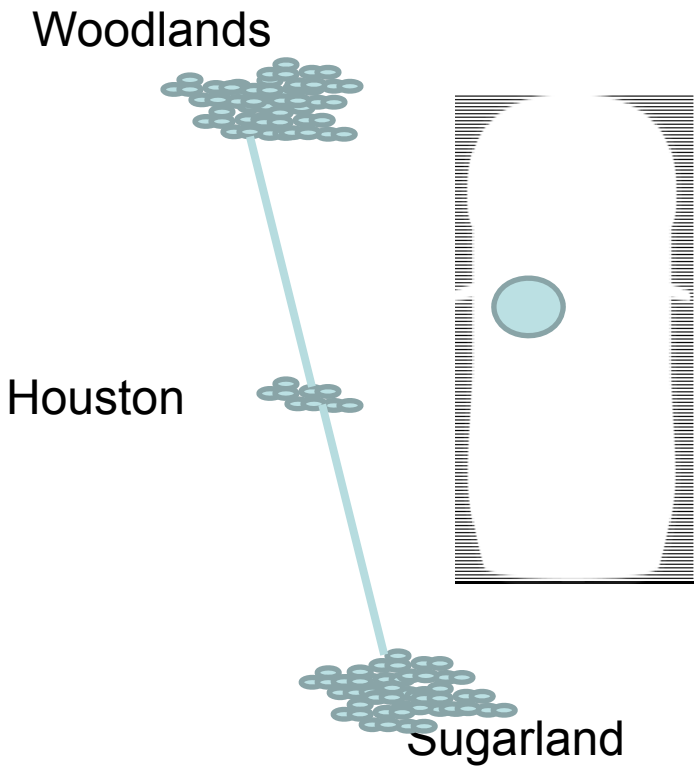
We did not have a MPG problem, we had a network structure problem

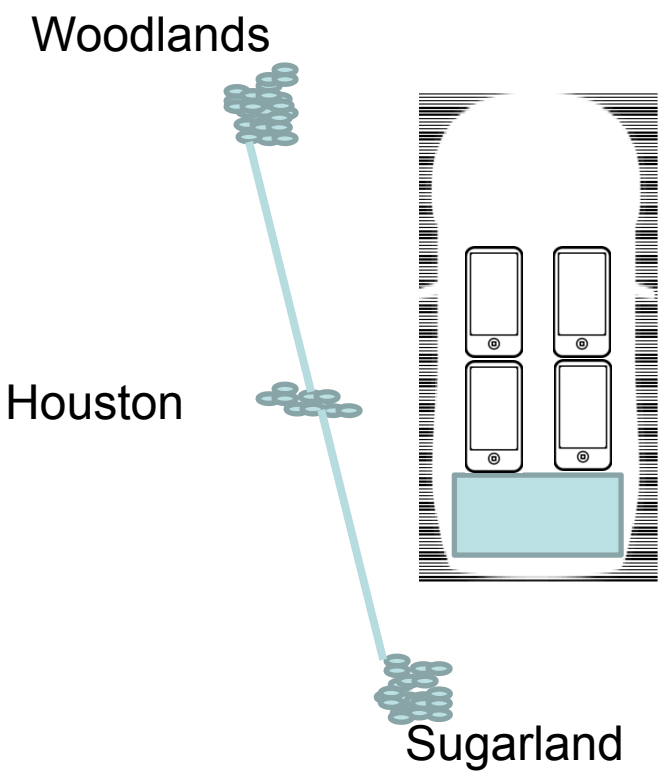




2017 Economy

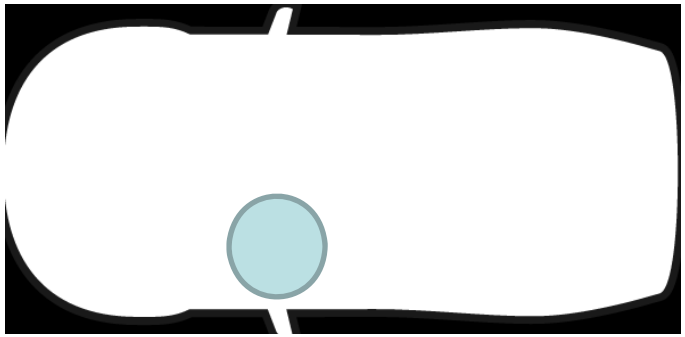
Because the units could not communicate we did not have a commodity
Wireless has unitized the automobile space



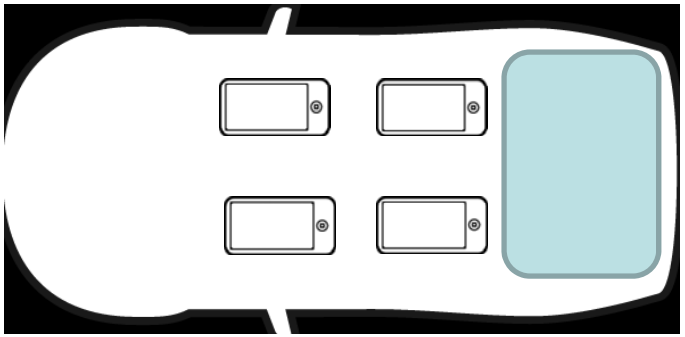


2017 Economy

2016 Current System



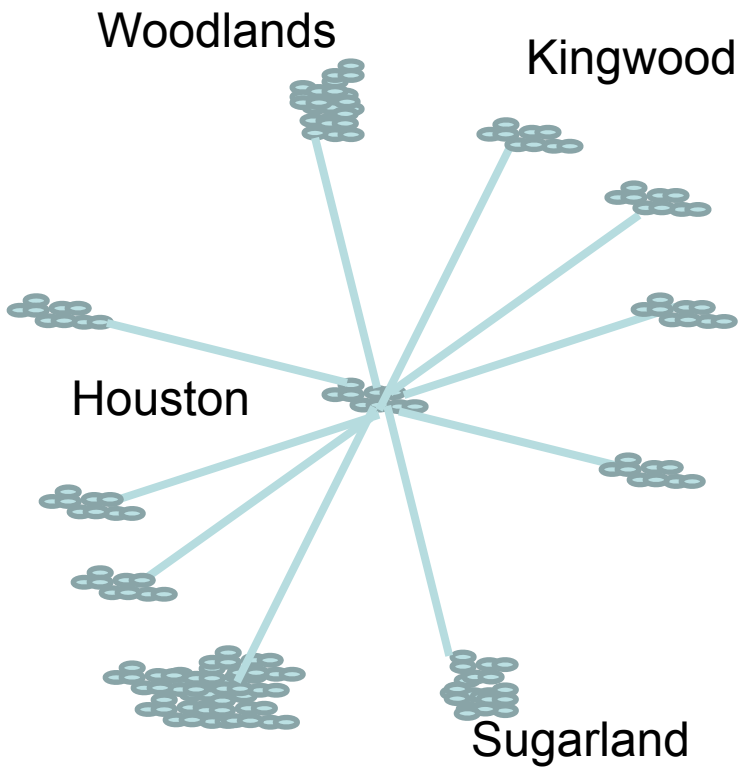
2020 - 2040 Future System



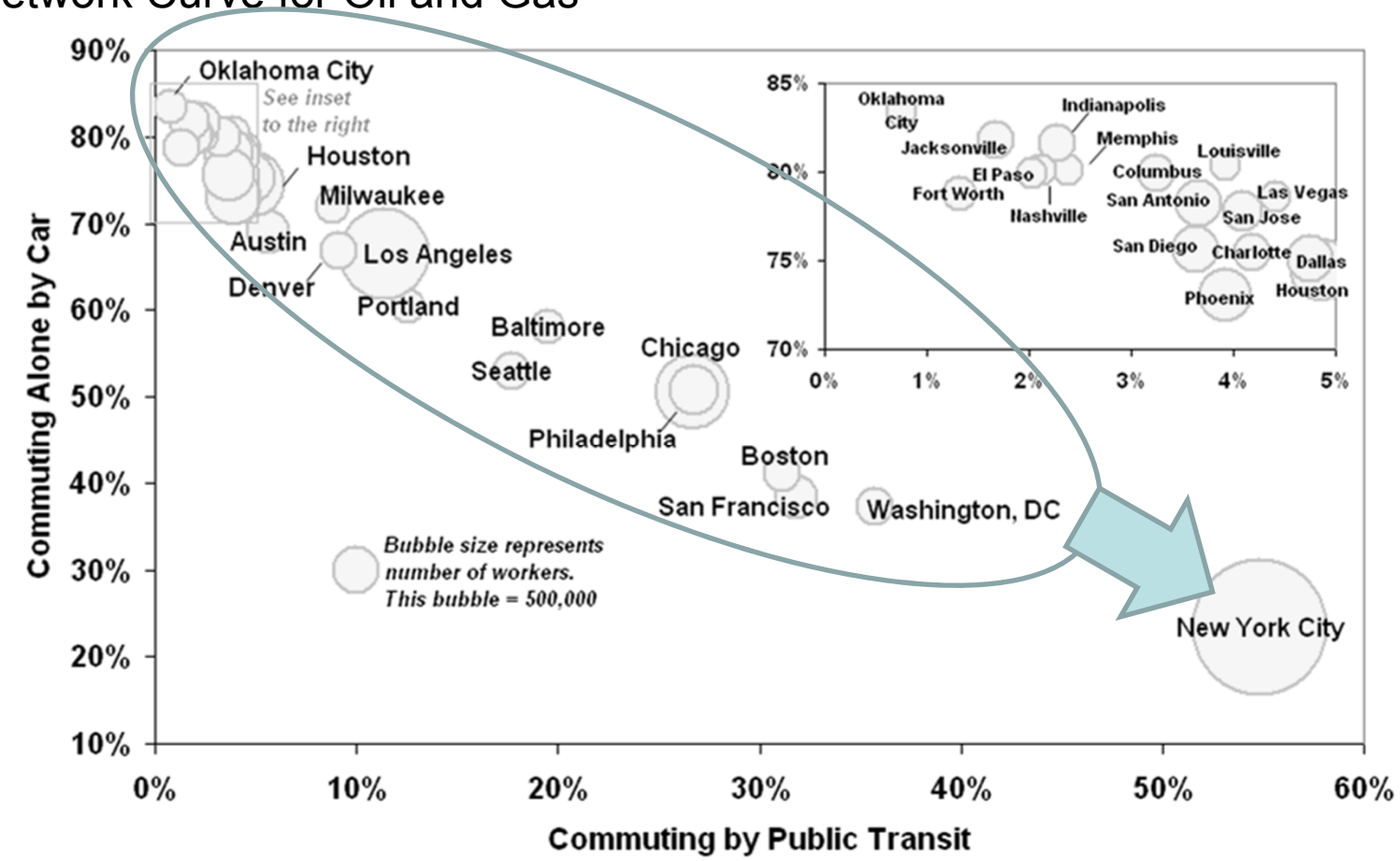
2017 Economy

Hub and spoke model is near at hand - 10 Destination Model simplified

- Short Haul – Cars
  Medium Haul - Bus, Train
  Long Haul - Plane, Bus, Train
- Network of N Nodes bounded
  n-1
- Un-Networked model
  requires 45 routes (current waste)

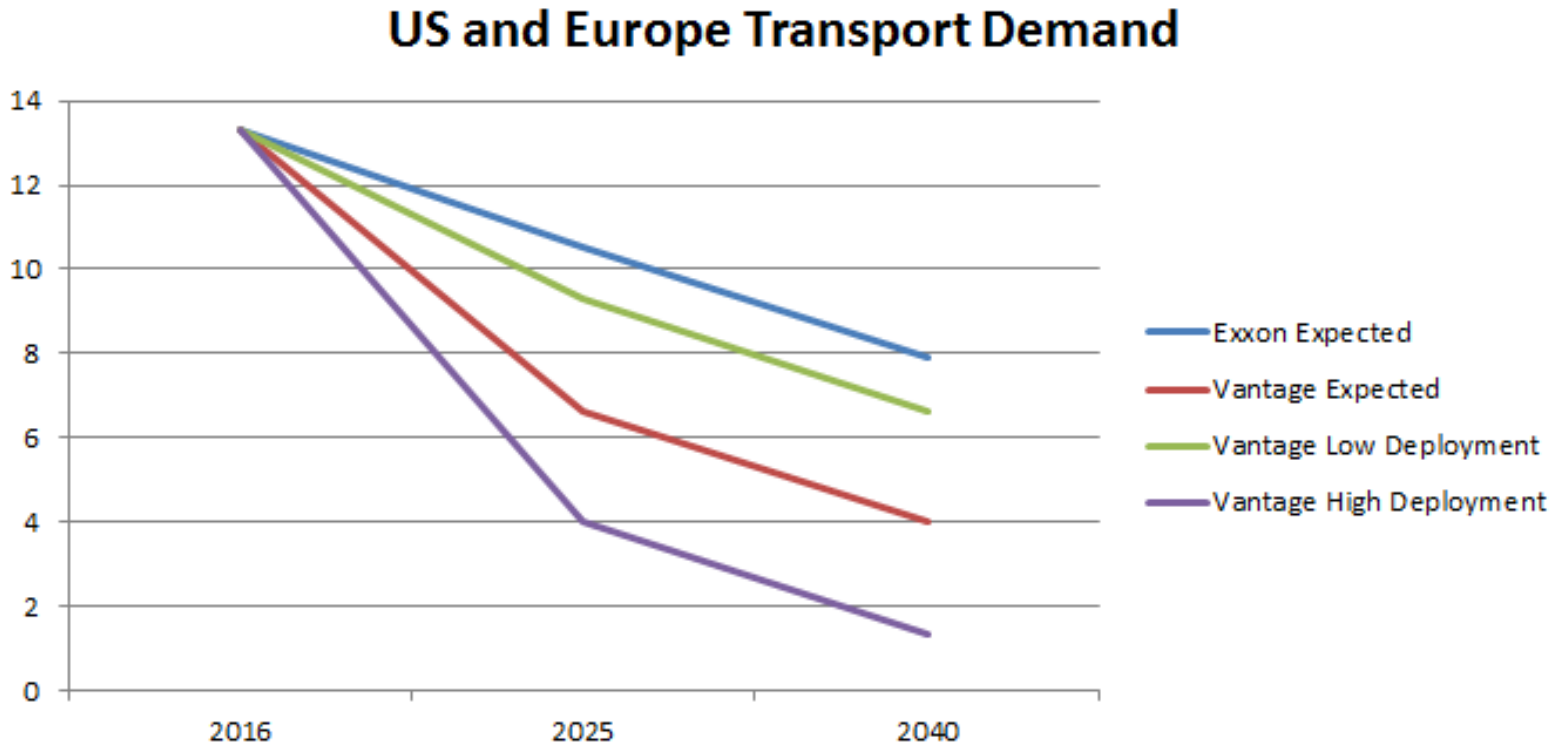


Network Curve for Oil and Gas



2017 Economy

Network Curve for Oil and Gas Demand ~4 MM lower than Exxon Case



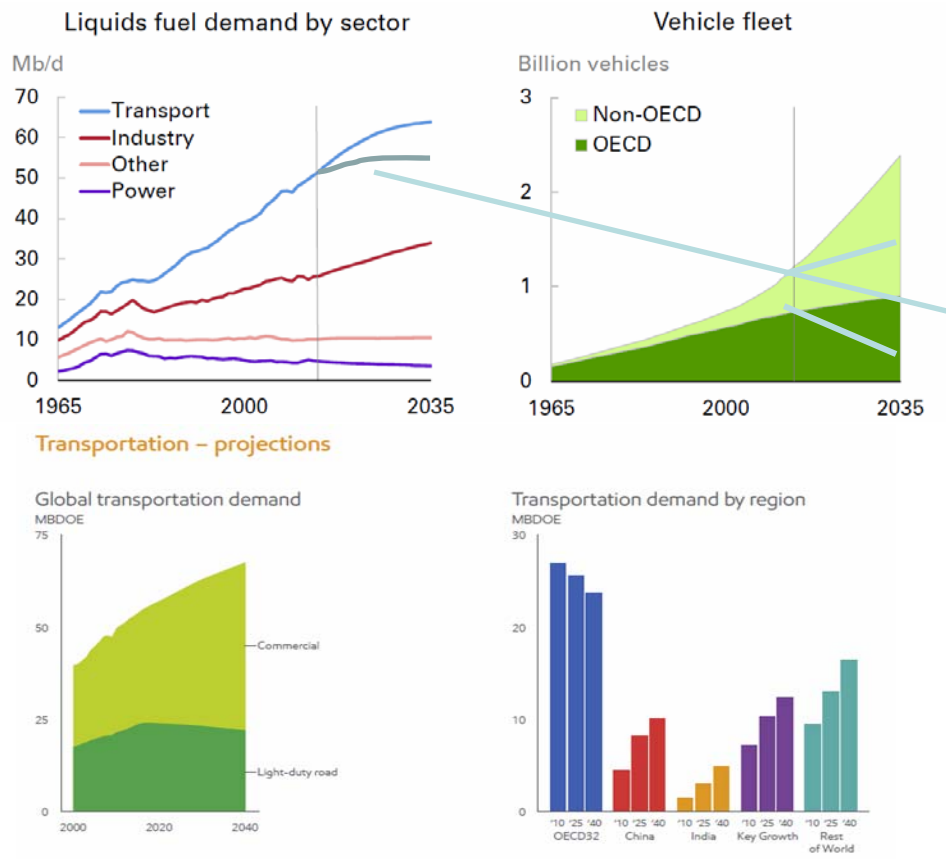
2017 Economy

What in industries will this effect? One of the largest deflationary stories the world has seen thus far

◇ Oil and Gas	25% to 50% reduction from Exxon case
◇ Automobiles	40% - 60% reduction in the US
◇ Insurance	80% reduction in the US
◇ Steel, rubber, plastics, ethylene	20% reduction
◇ Labor productivity	10% improvement
◇ Freight	10% improvement

2017 Economy

How do BP and Exxon compare the future (both~ 63 MM BBl/day):

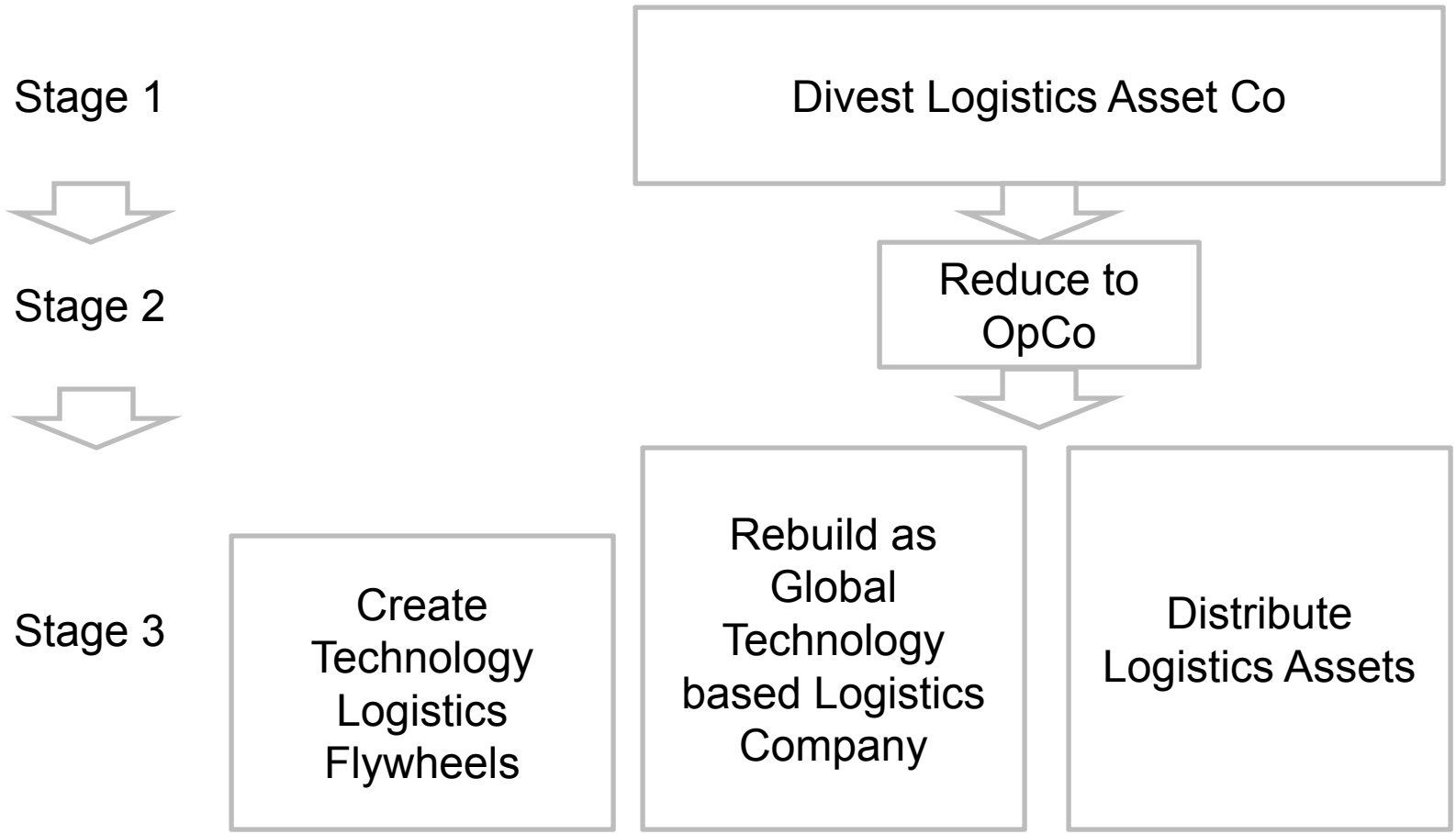


How does this change with a reduction in the Auto fleet and network riding?

2017 Strategy

Strategic Recommendations

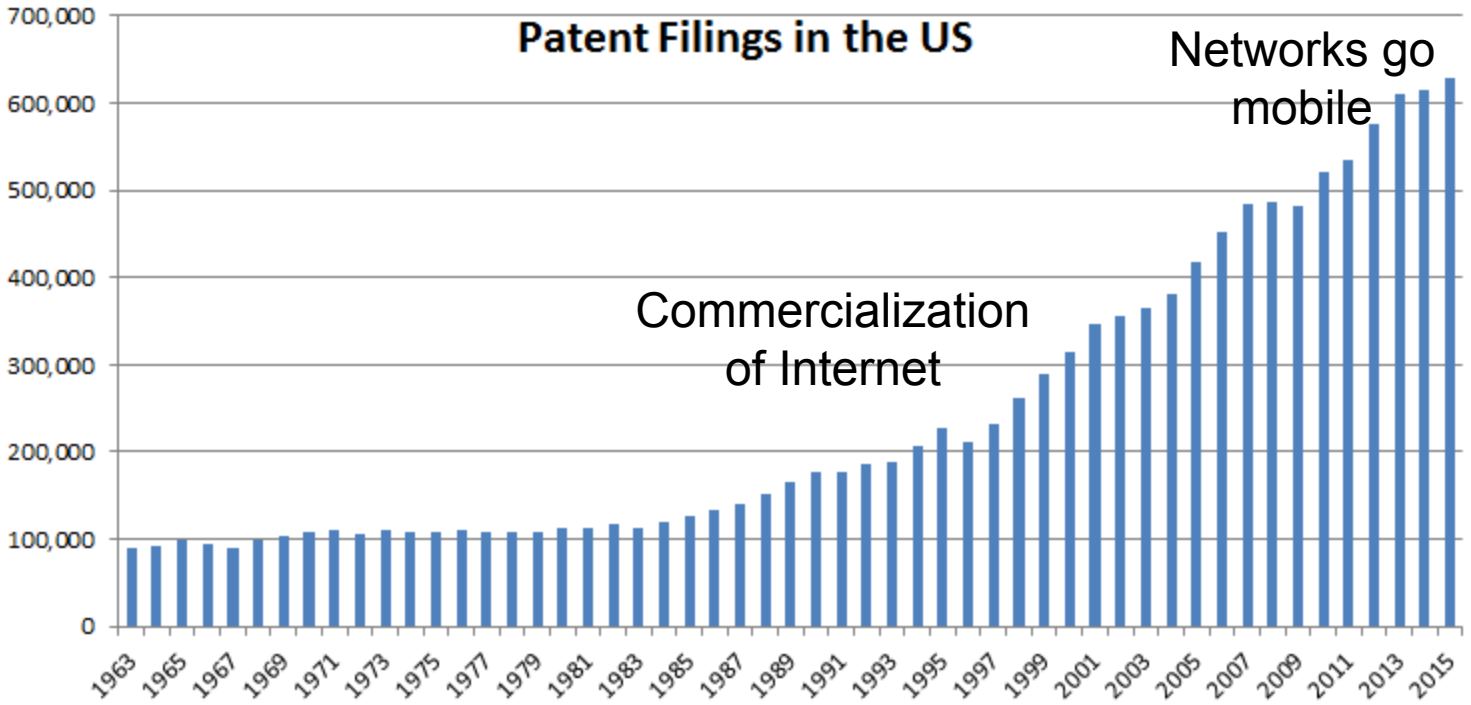
2017 Strategy



2017 Economy

Industrial Revolution to Tech Economy

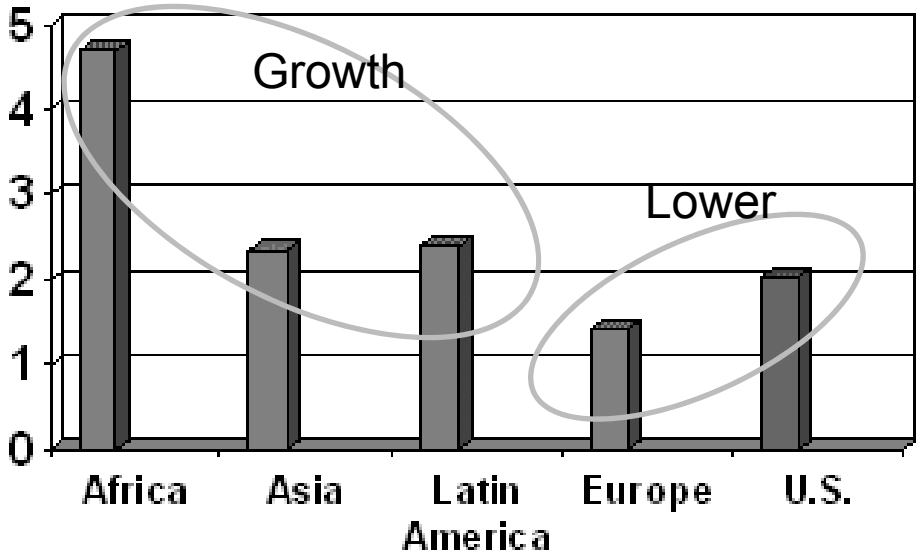
Innovation in America – Forthcoming rate of change



2017 Economy

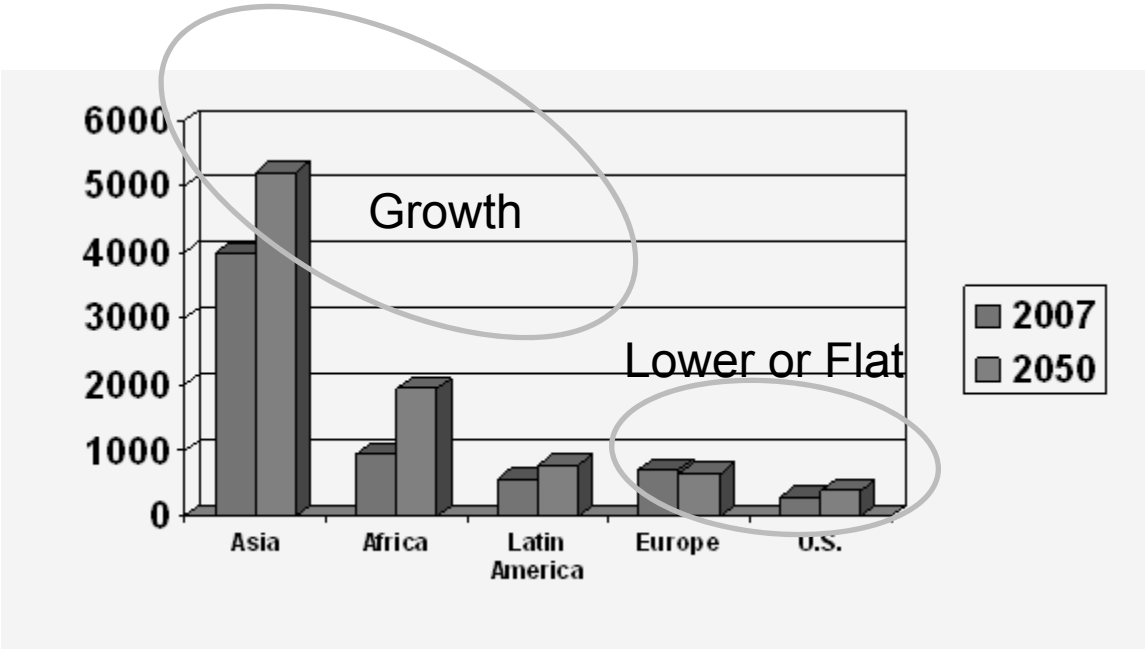
Assumptions on Oil from Majors

Human Fertility Rates

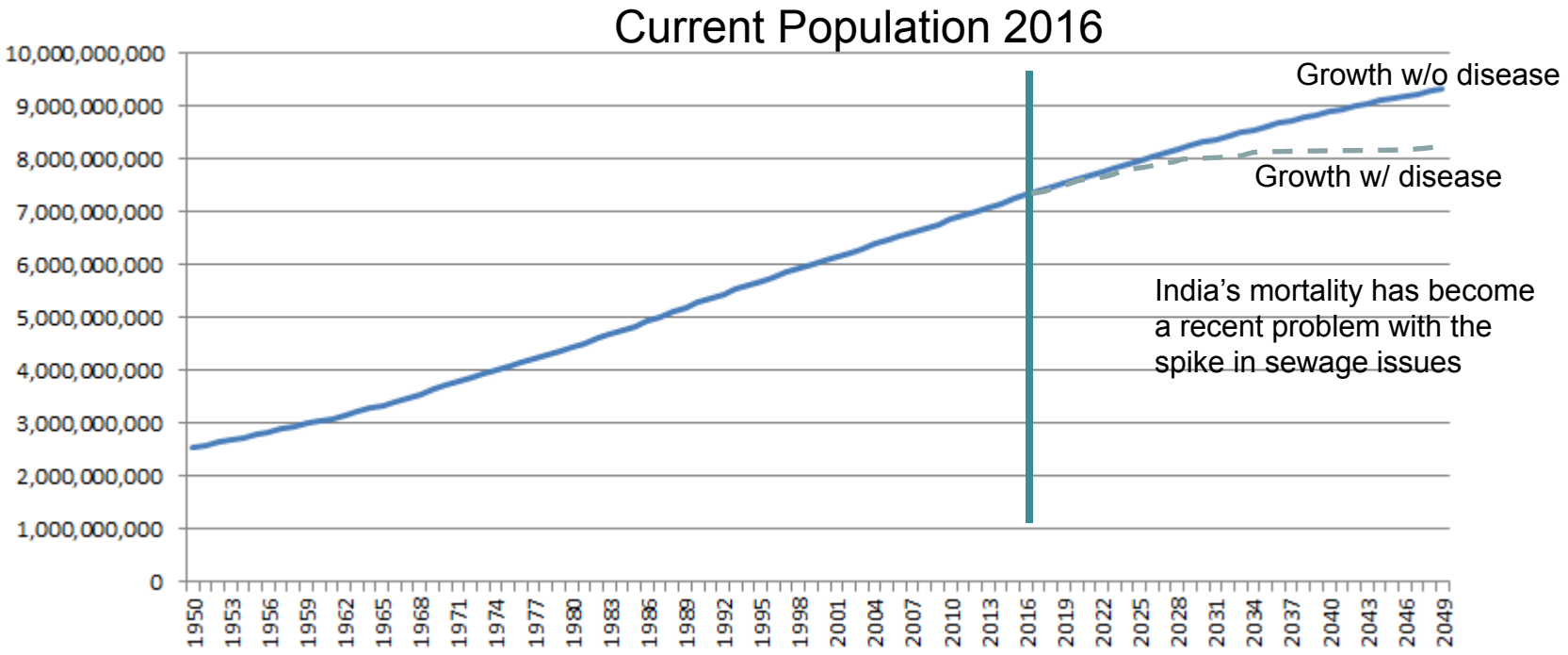


2017 Economy

Population growth

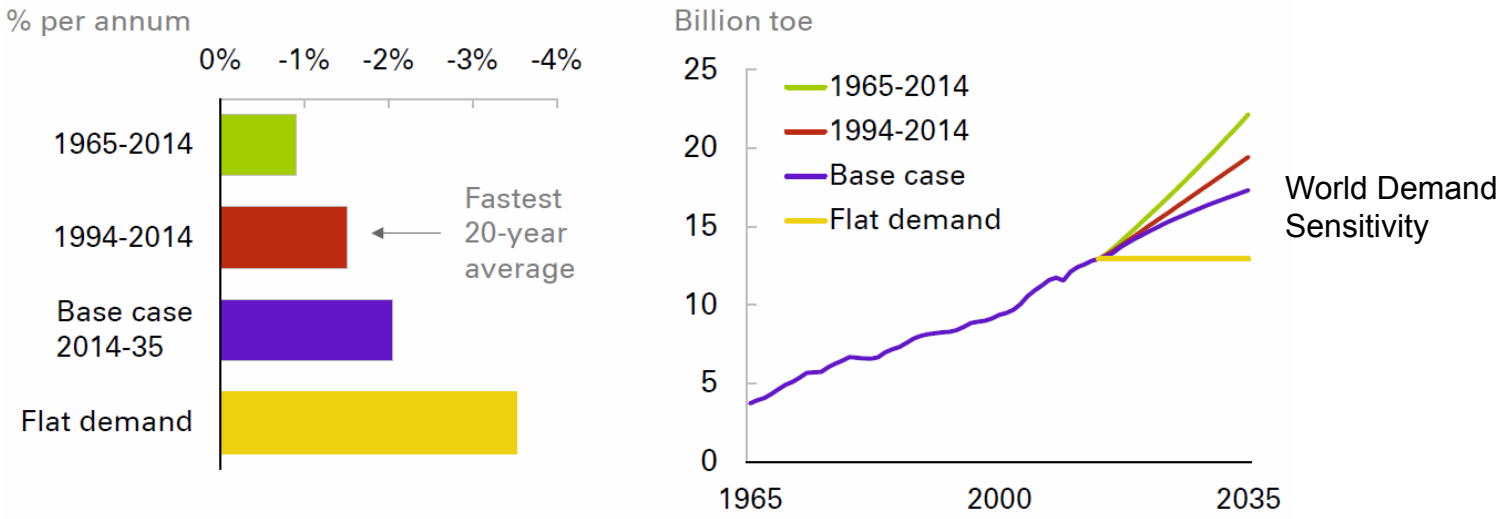


Population growth - Forecast

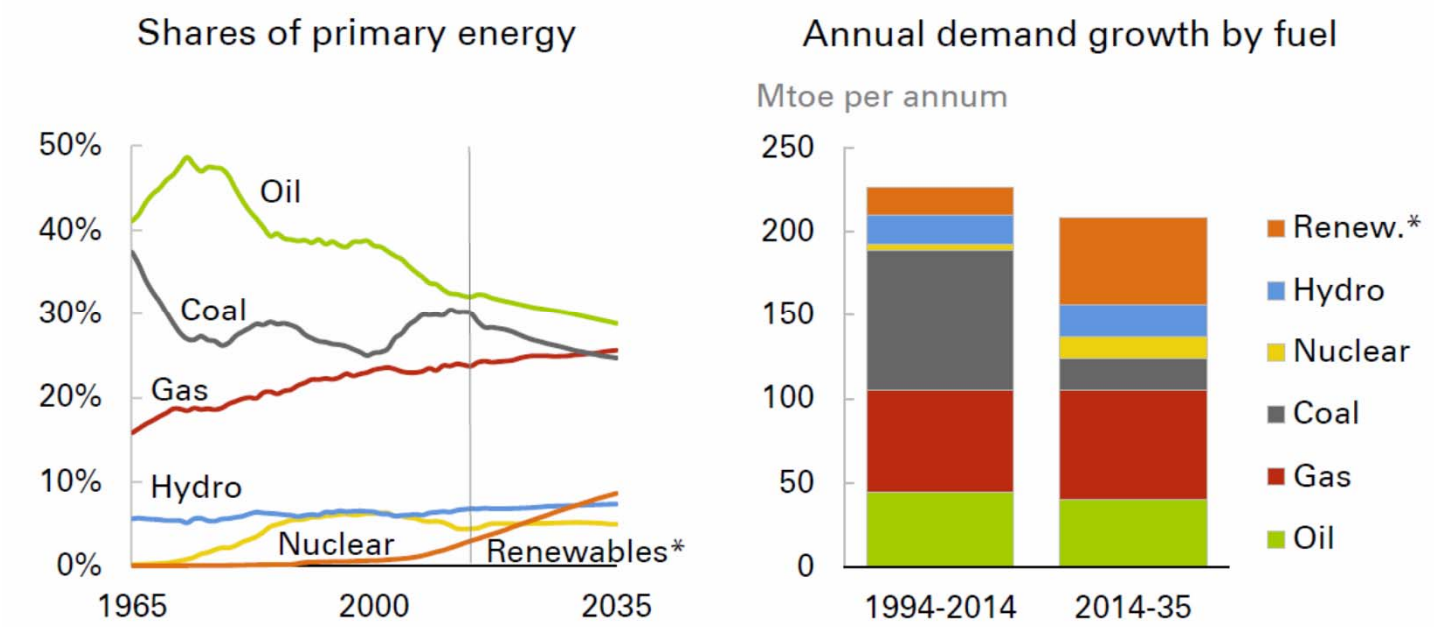


BP Energy Demand Forecast

Energy intensity and energy demand

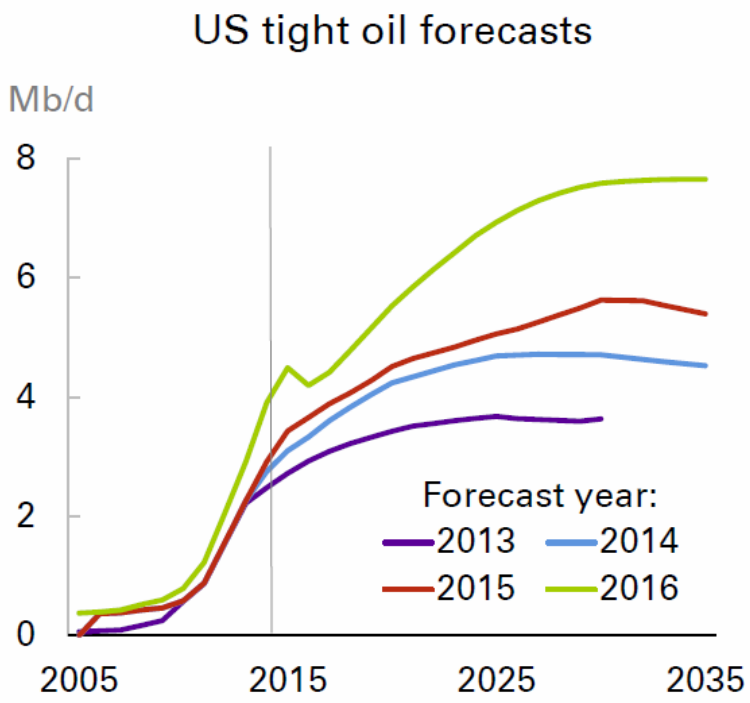


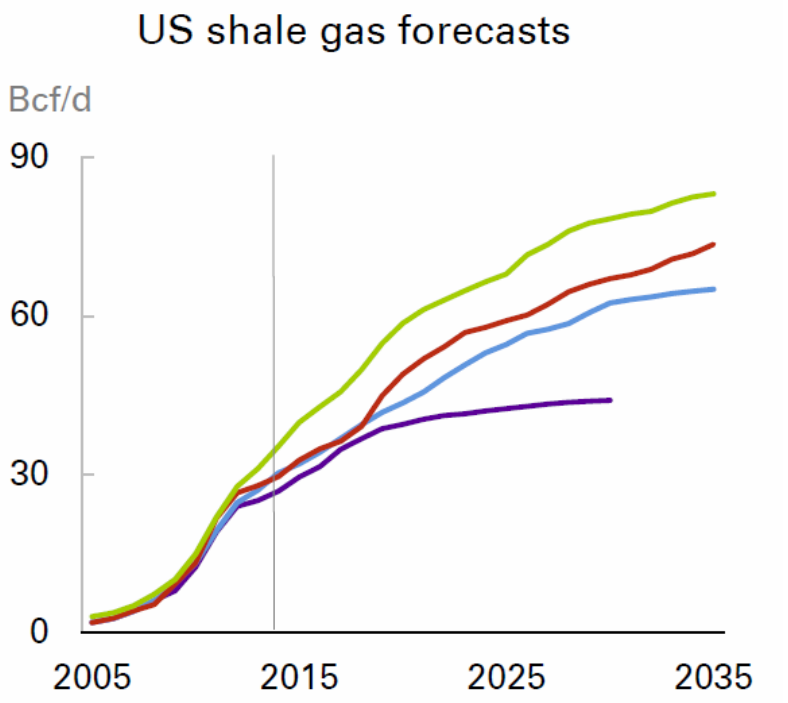
BP Energy Demand Forecast



2017 Economy

BP Energy Supply Forecast – Note the Meteoric changes; demand will be greater





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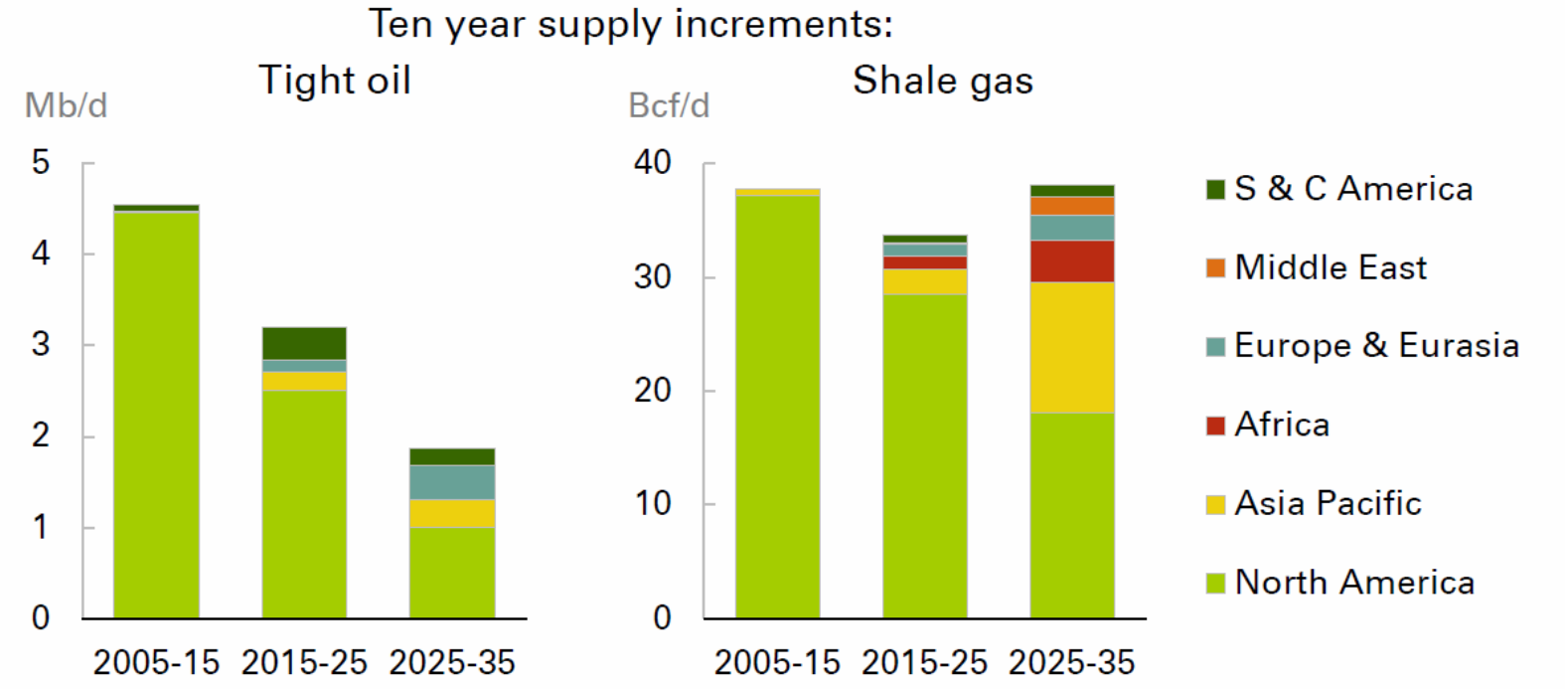
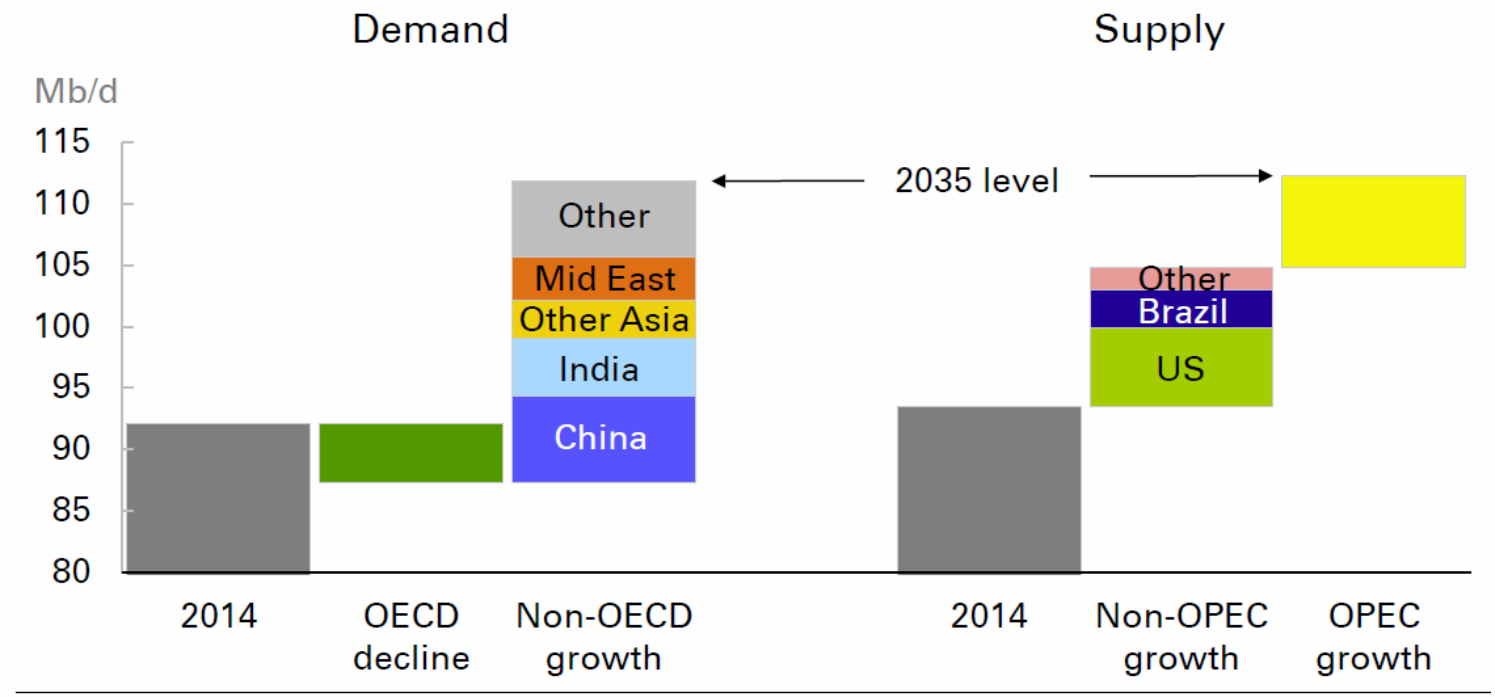


BP Energy Supply Forecast



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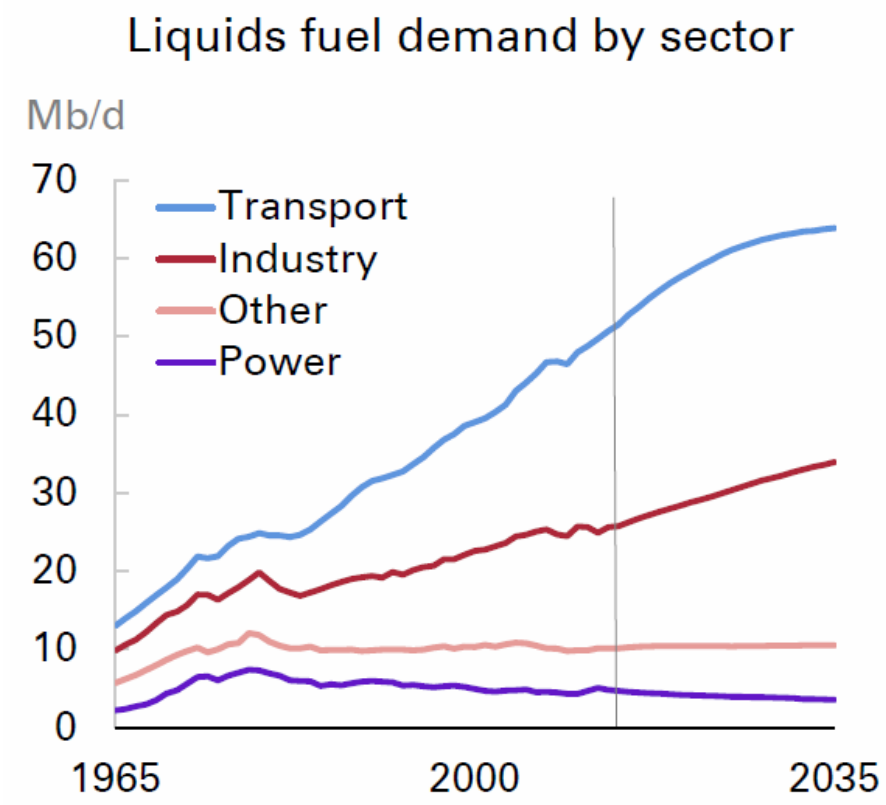
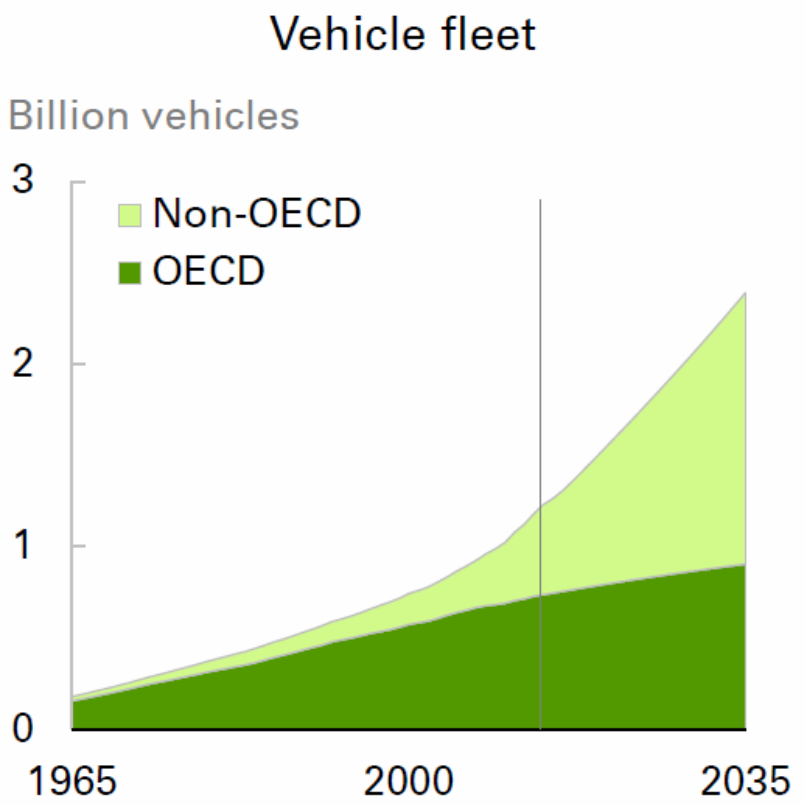




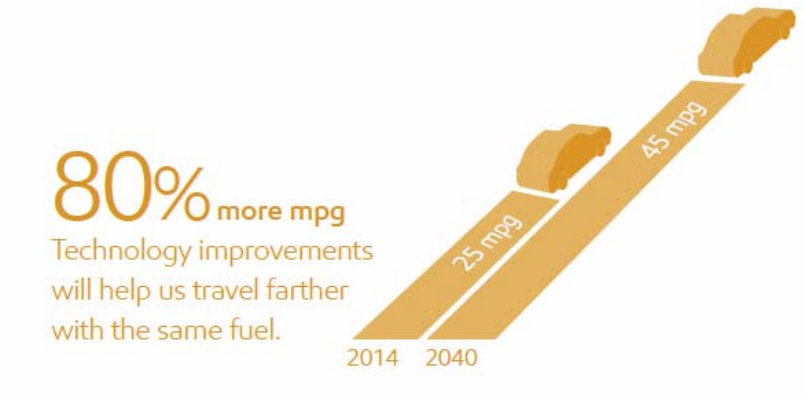
2017 Economy

Exxon Energy Demand Forecast

OECD 32 570 Autos per 1,000

Undeveloped 100 Autos per 1,000

2016 1 Billion light duty Vehicles



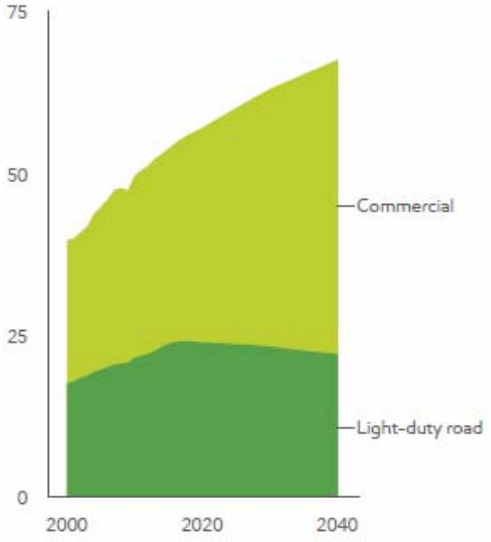
2040 Exxon expects 1.8 Billion light duty Vehicles

2040 Exxon expects 45 MPG compared to 25 MPG today

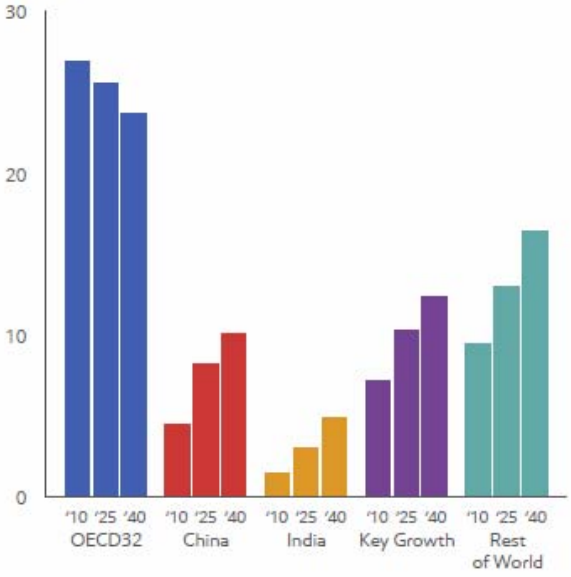
Exxon's Projections

Transportation – projections

Global transportation demand

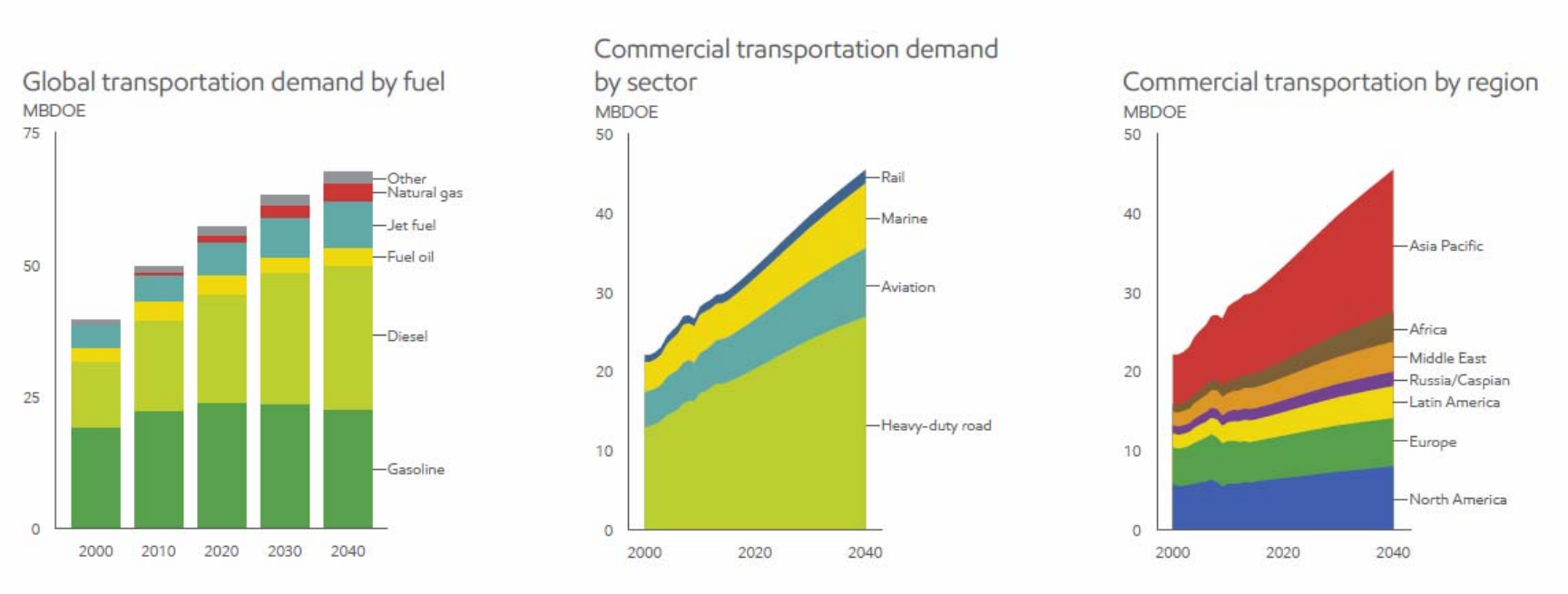


Transportation demand by region



2017 Economy

Exxon's breakout

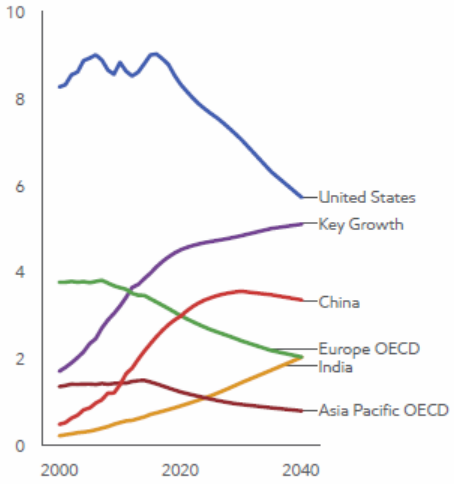


2017 Economy

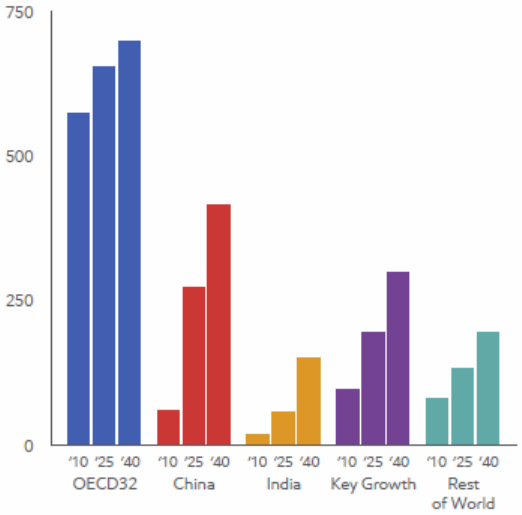
Exxon's breakout

Transportation – projections

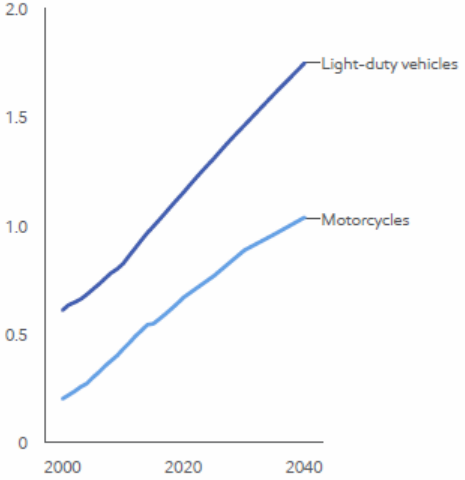
Light-duty vehicle demand trends



Light-duty vehicle fleet by region

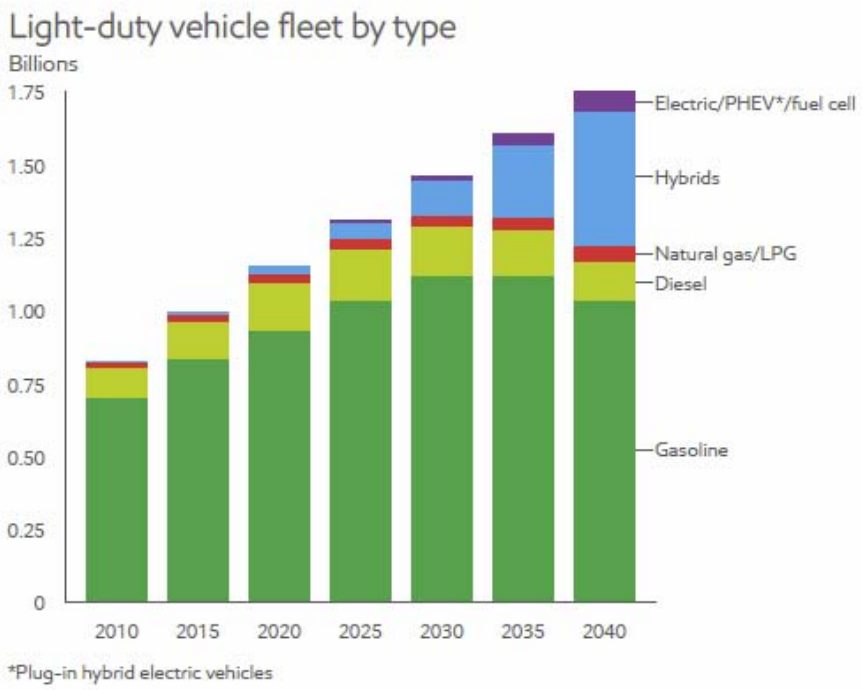


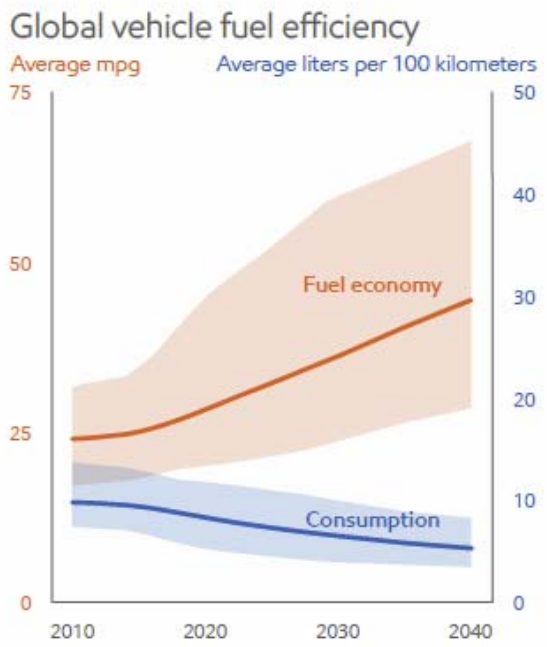
Light-duty vehicles and motorcycles



2017 Economy

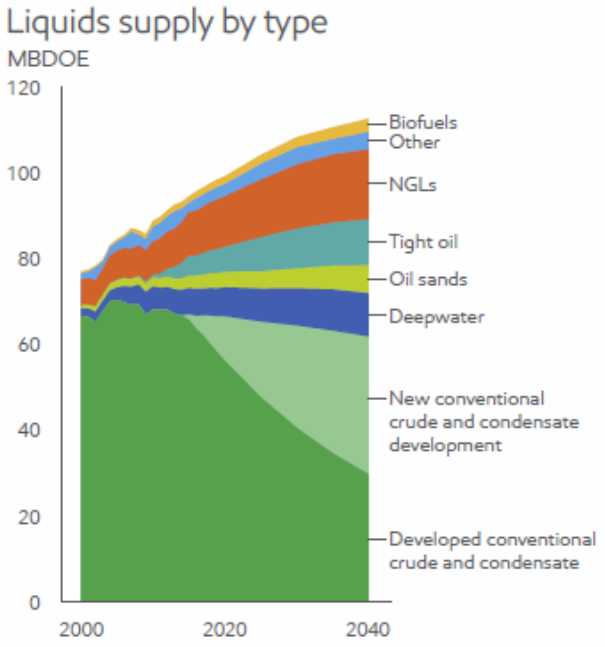
Exxon's breakout

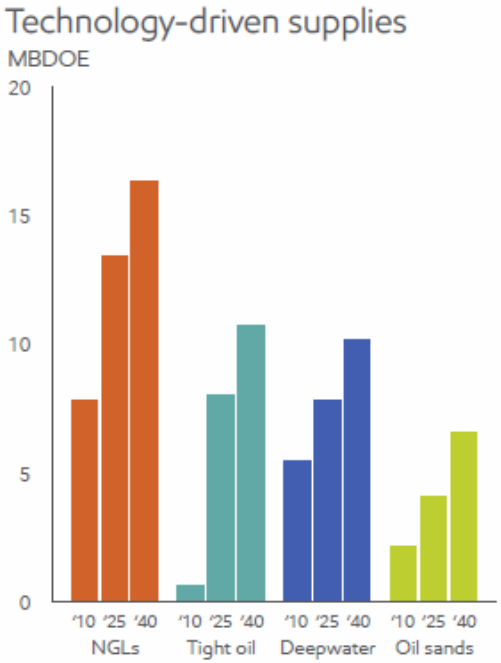




Exxon Supply Assumptions

Liquids – projections



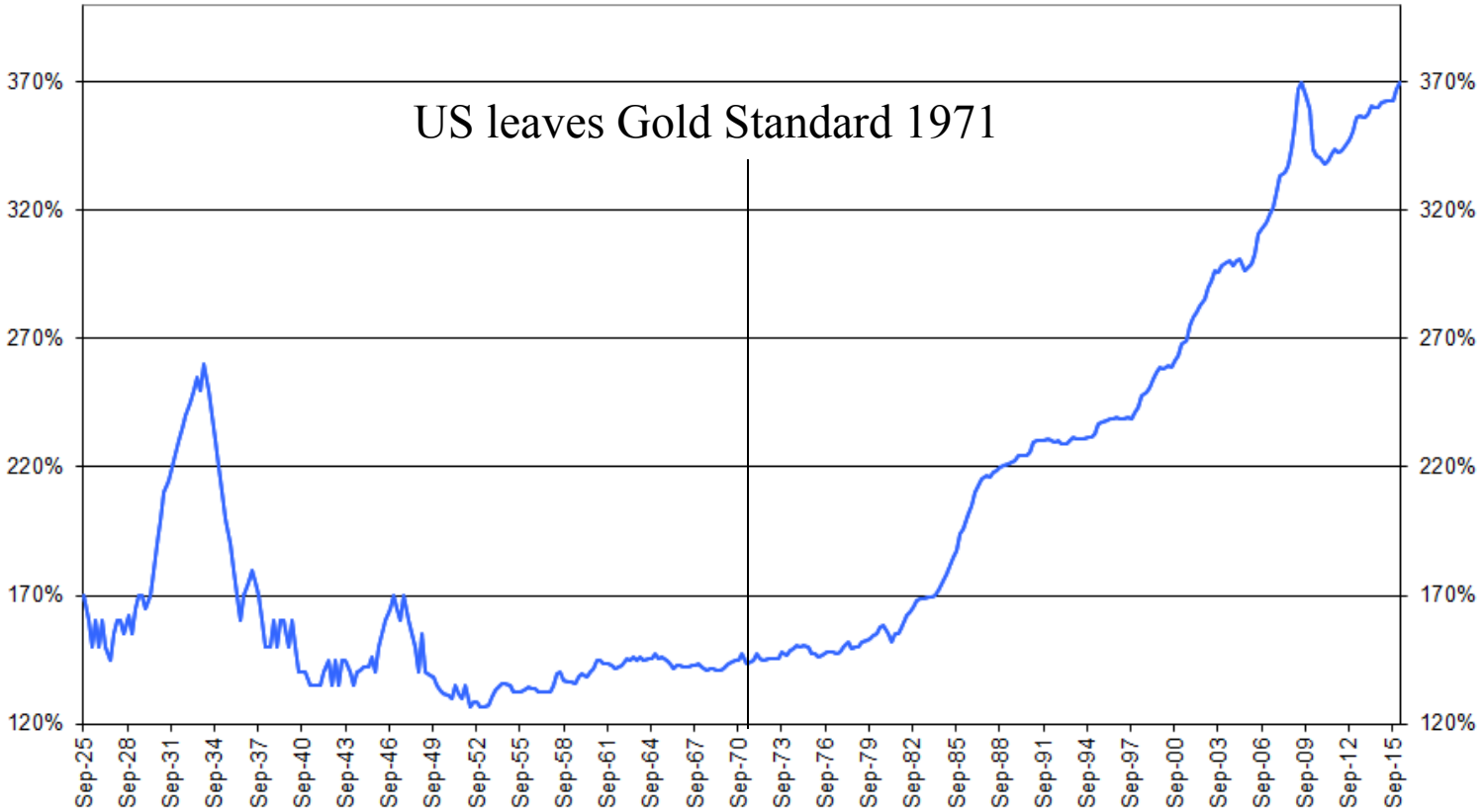


2017 Economy

General Economy

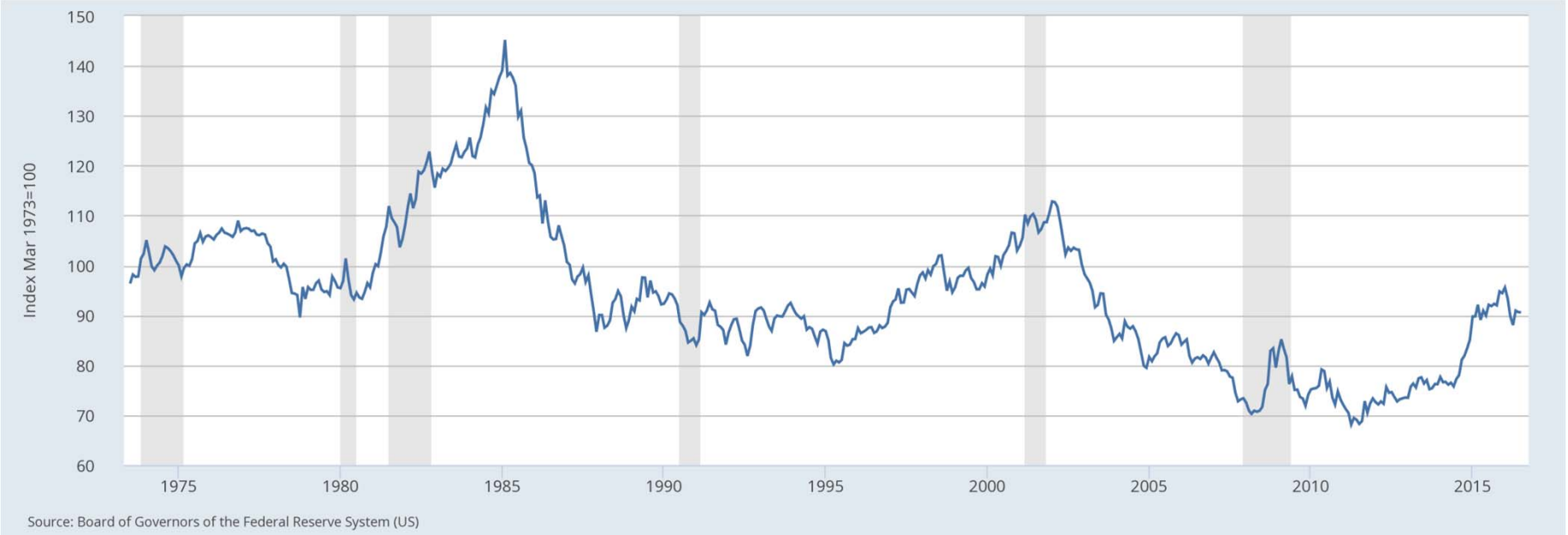
2017 Economy

Total US Debt (Corporate + Government + Household) / US GDP
Current Ratio is $61.1 Trillion Debt / $16.5 Trillion GDP = 370%
June 2016 Data - Federal Reserve

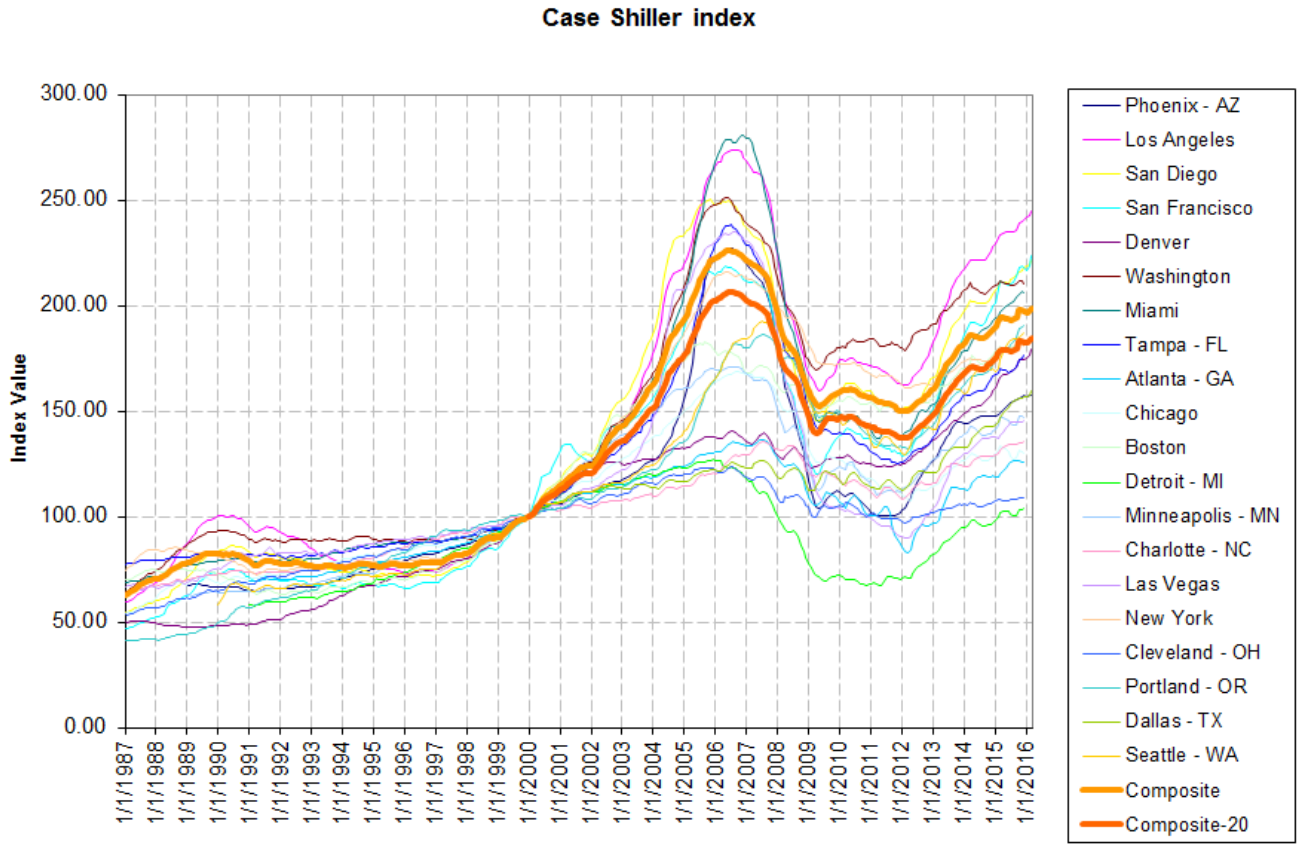


2017 Economy

Trade weighted US Dollar Index of Major currencies index includes the Euro Area, Canada, Japan, United Kingdom, Switzerland, Australia, and Sweden.



Home prices


Case Shiller index
Index Value
300.00
250.00
200.00
150.00
100.00
50.00
0.00
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1/1/1988
1/1/1989
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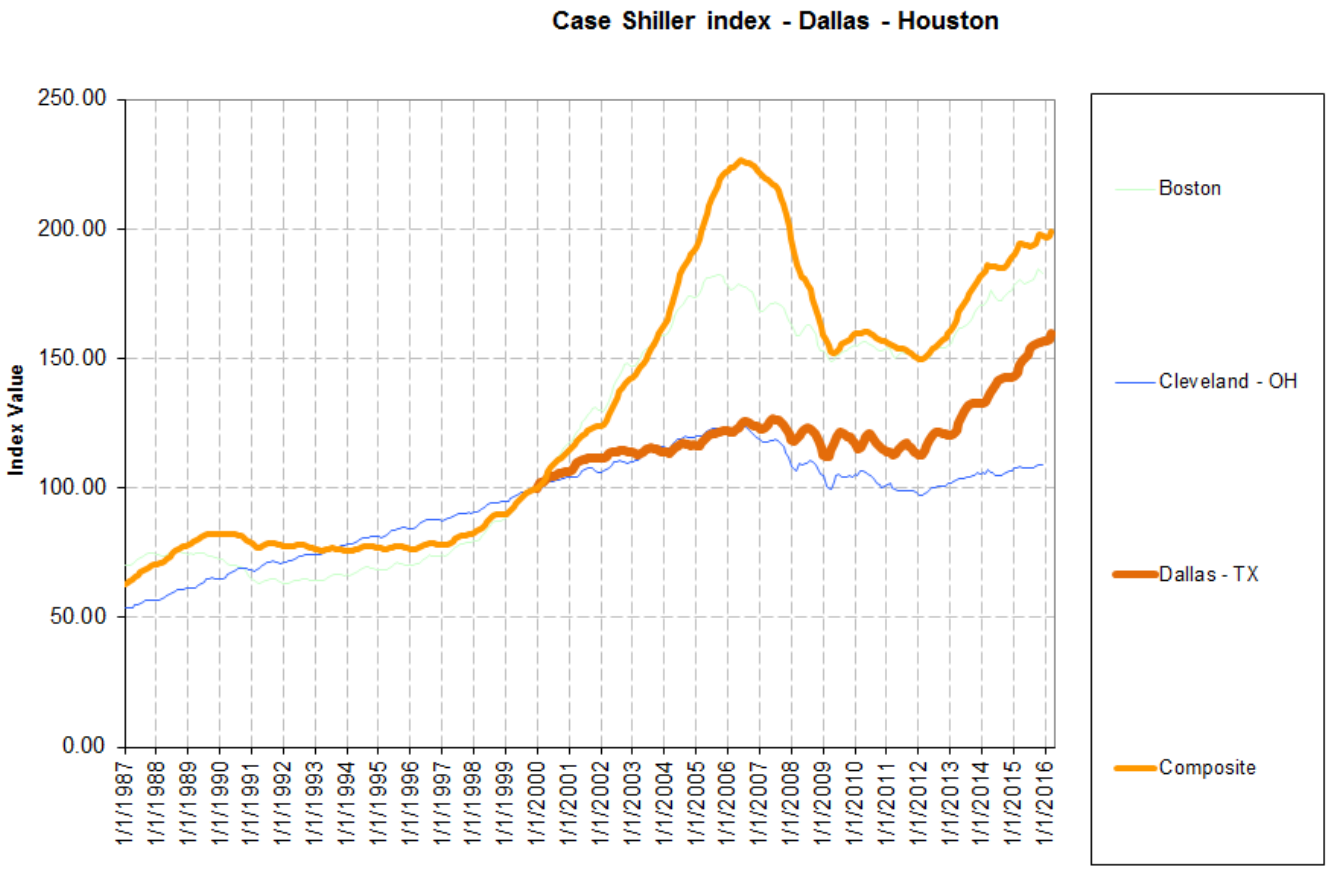
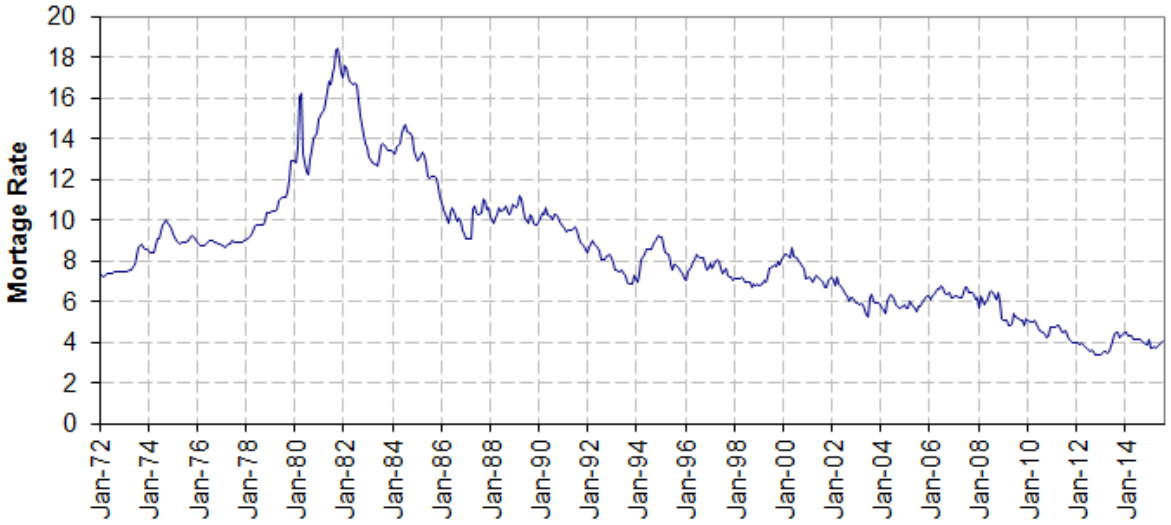
Los Angeles
San Diego
San Francisco
Denver
Washington
Miami
Tampa - FL
Atlanta - GA
Chicago
Boston
Detroit - MI
Minneapolis - MN
Charlotte - NC
Las Vegas
New York
Cleveland - OH
Portland - OR
Dallas - TX
Seattle - WA
Composite
Composite-20

Home prices – Texas real estate move higher has been unprecedented

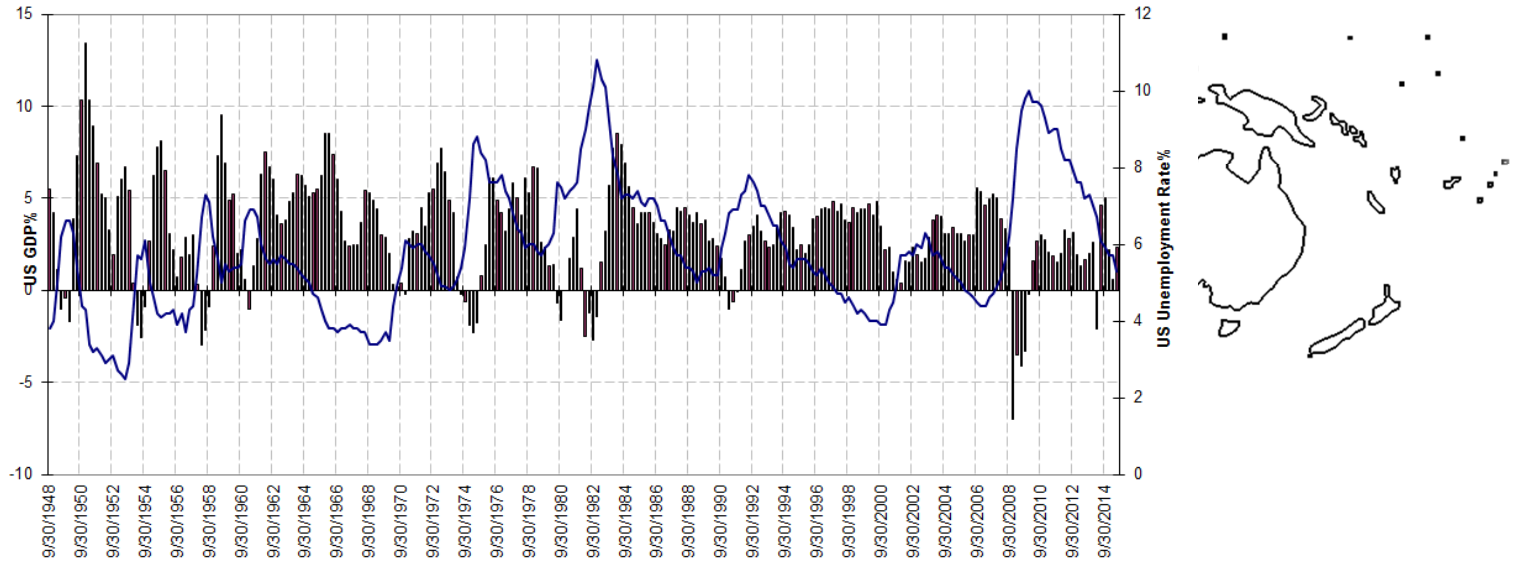


2017 Economy

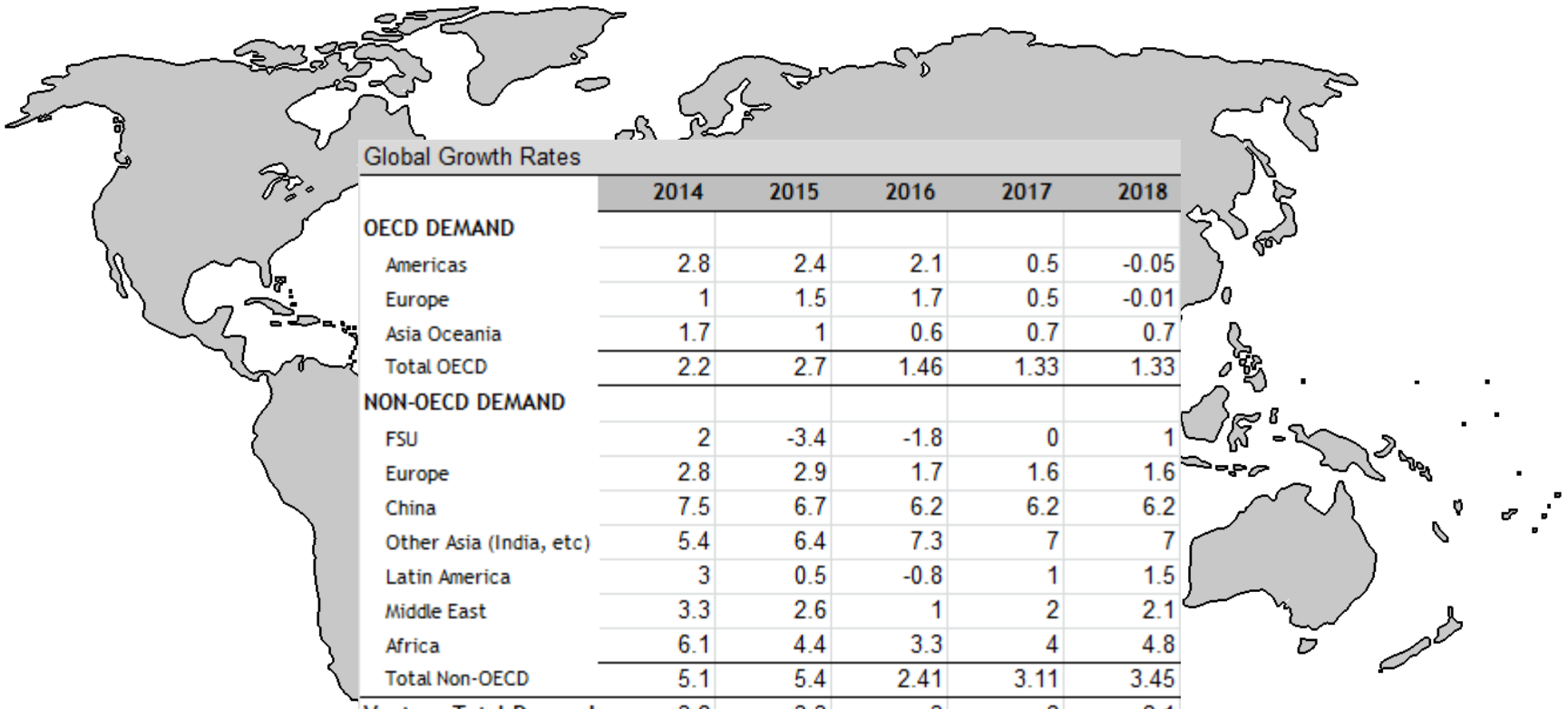
30 Year Fixed Mortgage Rates(Blue line)



2017 Economy



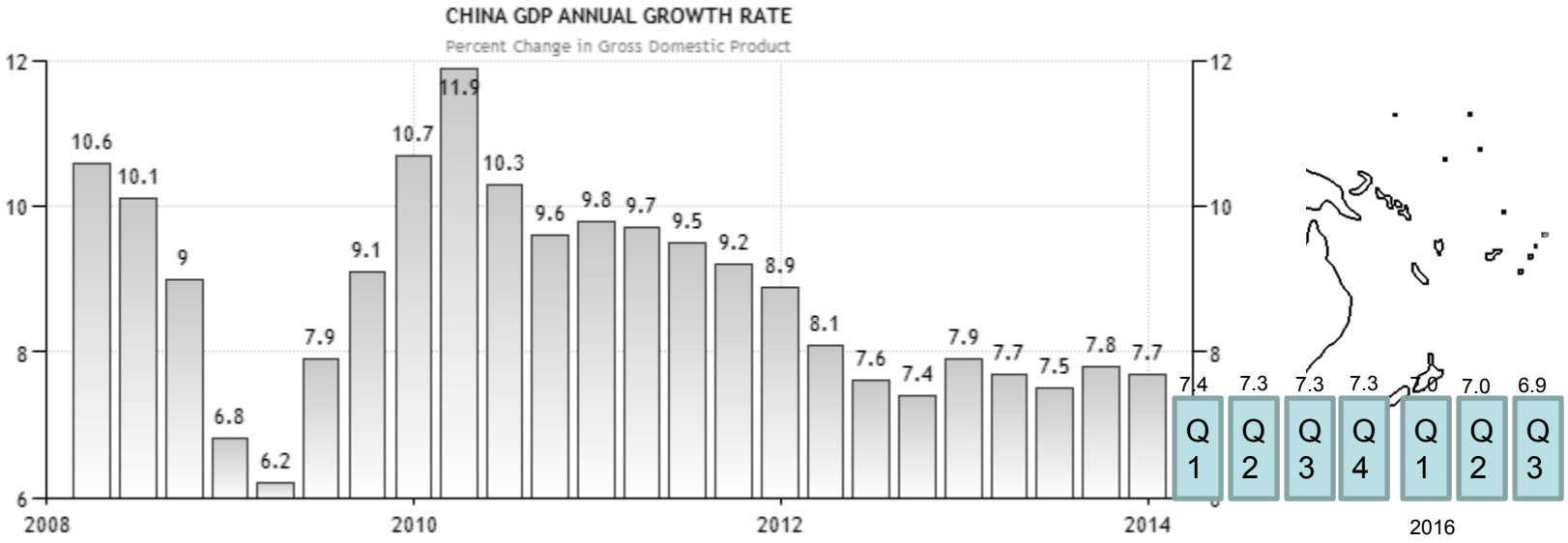
2017 Economy



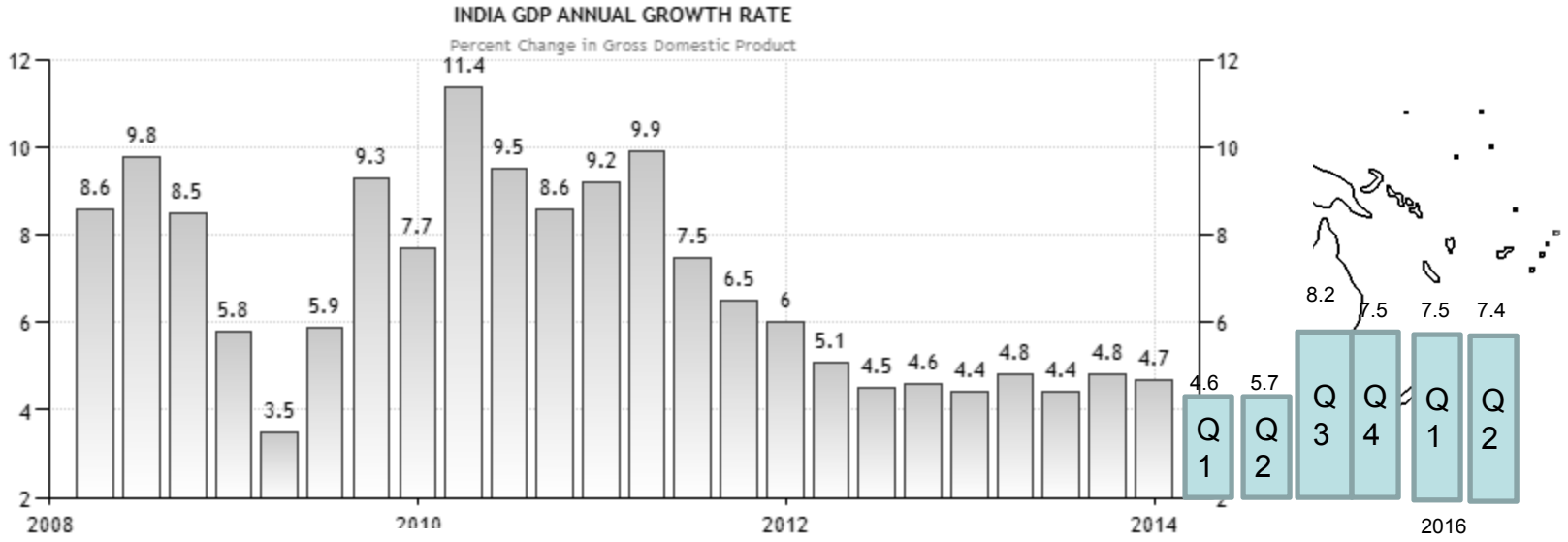
Global Growth Rates

	2014	2015	2016	2017	2018
OECD DEMAND					
Americas	2.8	2.4	2.1	0.5	-0.05
Europe	1	1.5	1.7	0.5	-0.01
Asia Oceania	1.7	1	0.6	0.7	0.7
Total OECD	2.2	2.7	1.46	1.33	1.33
NON-OECD DEMAND					
FSU	2	-3.4	-1.8	0	1
Europe	2.8	2.9	1.7	1.6	1.6
China	7.5	6.7	6.2	6.2	6.2
Other Asia (India, etc)	5.4	6.4	7.3	7	7
Latin America	3	0.5	-0.8	1	1.5
Middle East	3.3	2.6	1	2	2.1
Africa	6.1	4.4	3.3	4	4.8
Total Non-OECD	5.1	5.4	2.41	3.11	3.45
Vantage Total Demand	3.2	3.3	3	2	2.1
IMF World (latest)	3.4	3.3	3.2	3.5	3.9

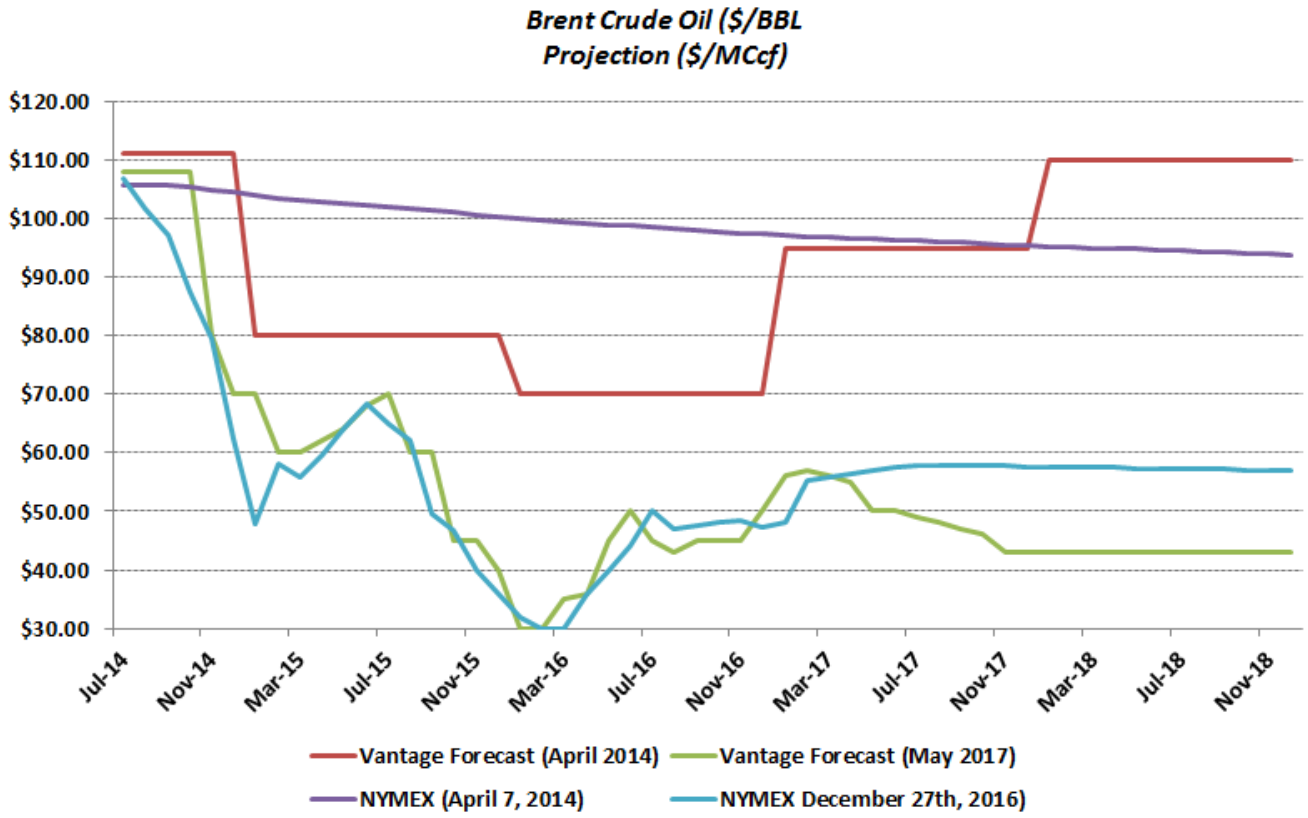
2017 Economy



2017 Economy



2017 Price of Oil



Super Major of the Future – a Strawman case

- All rigs autonomous by 2022
- Cutting ex-pat pay and eliminating 90% of ex-pats
- Eliminate travel through virtual travel and augmented reality
- Cut personnel costs by 50%
- Drilling decisions all reliant on big data – eliminate subjectivity

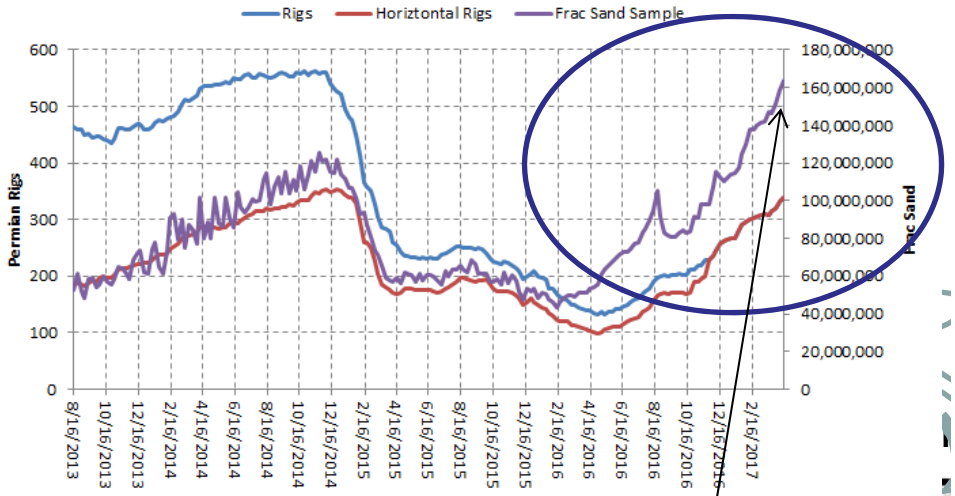
Oil Markets – Frac Sand Data

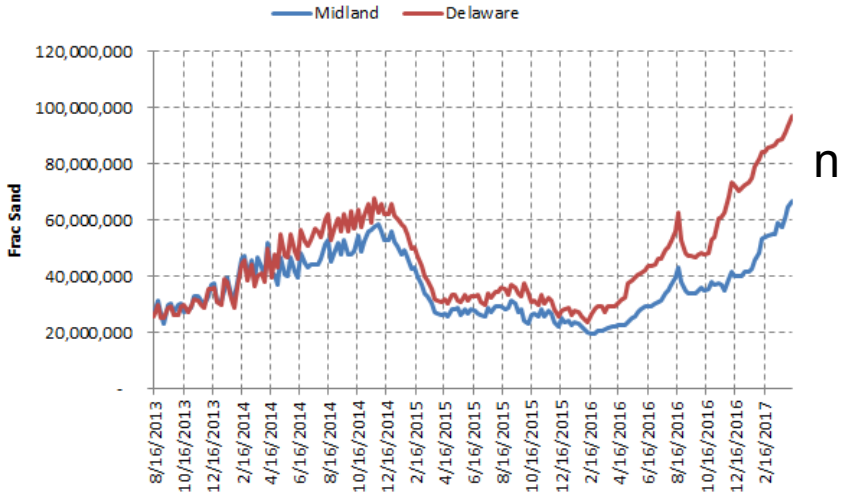
2017 Oil Production by Basin

Permian Detail

2017 Frac Sand Example

Frac Sand Examples – Permian – Record Production by June 2017





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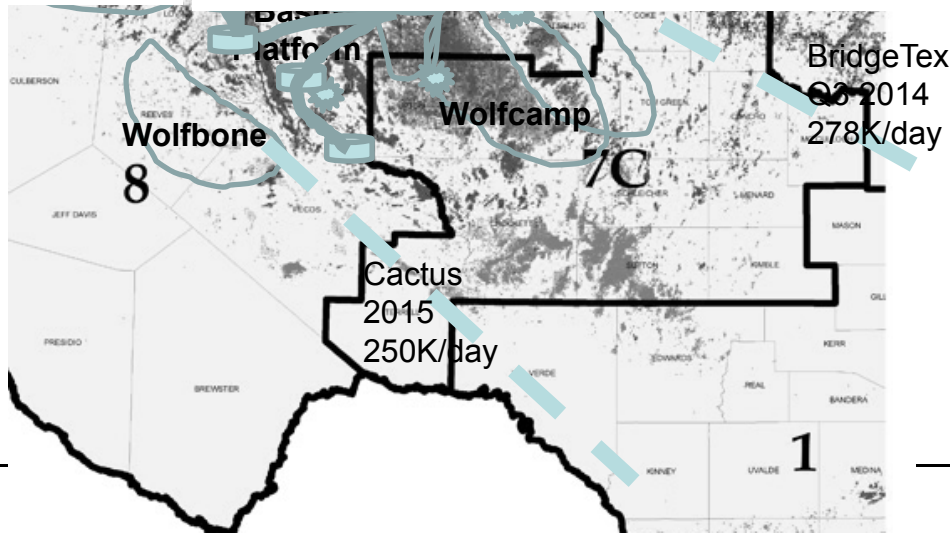
Frac sand data has really made a significant turn in the past 9 months in the Permian

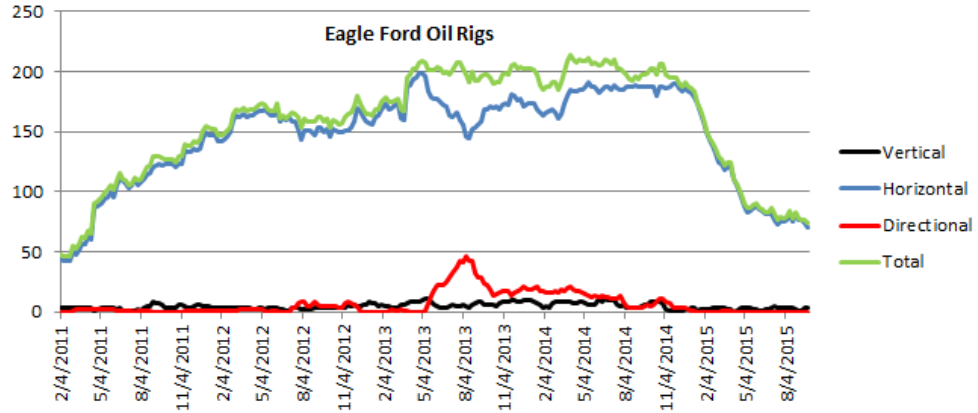


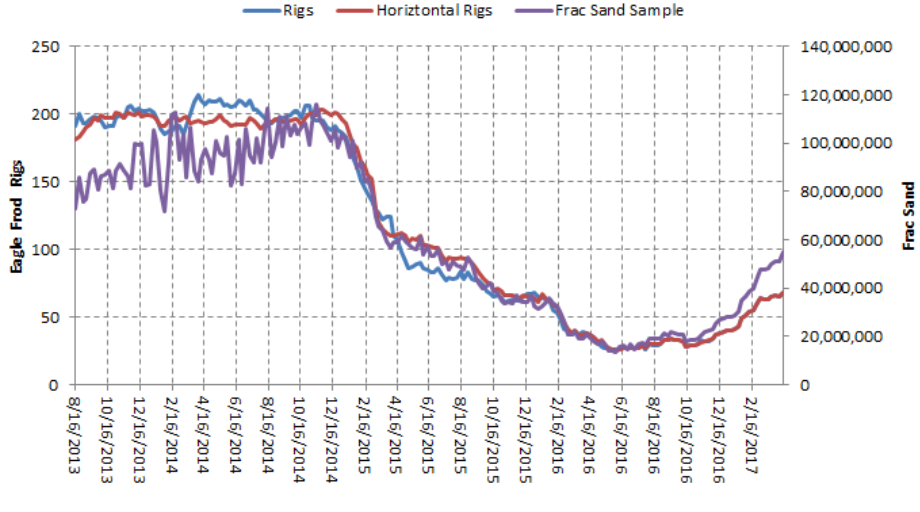
2017 Oil Production by Basin

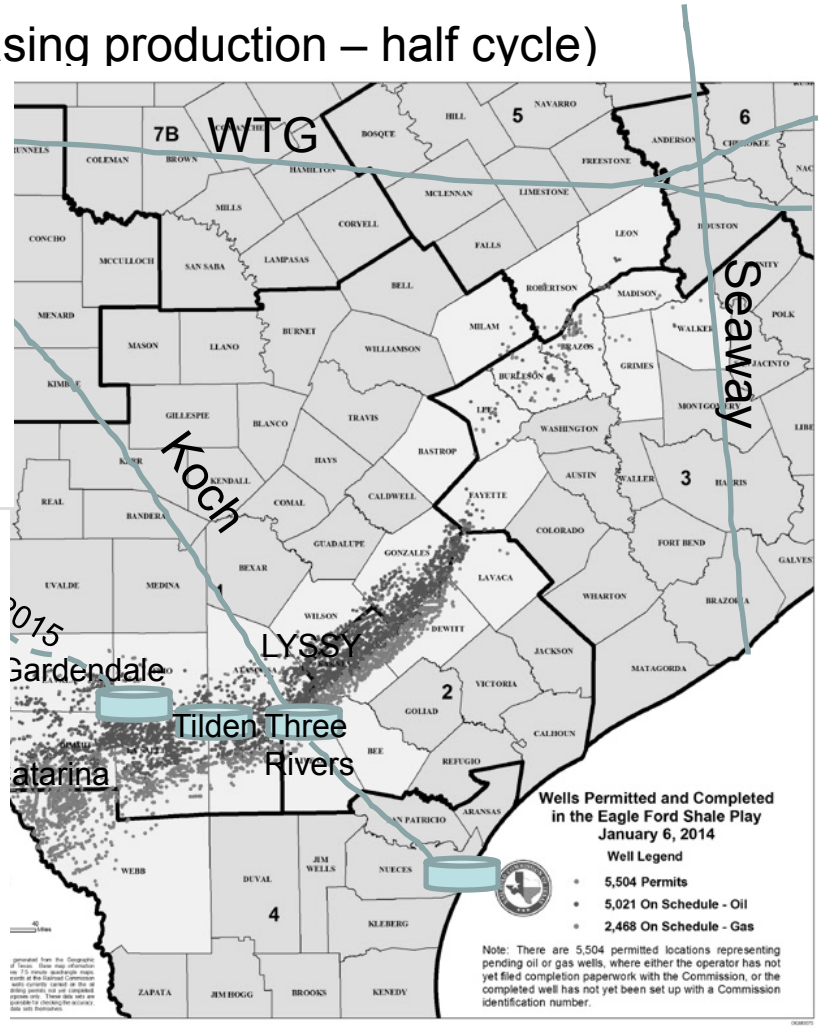
Eagle Ford Detail

2017 Frac Sand Example

Frac Sand Examples – Eagle Ford (increasing production – half cycle)





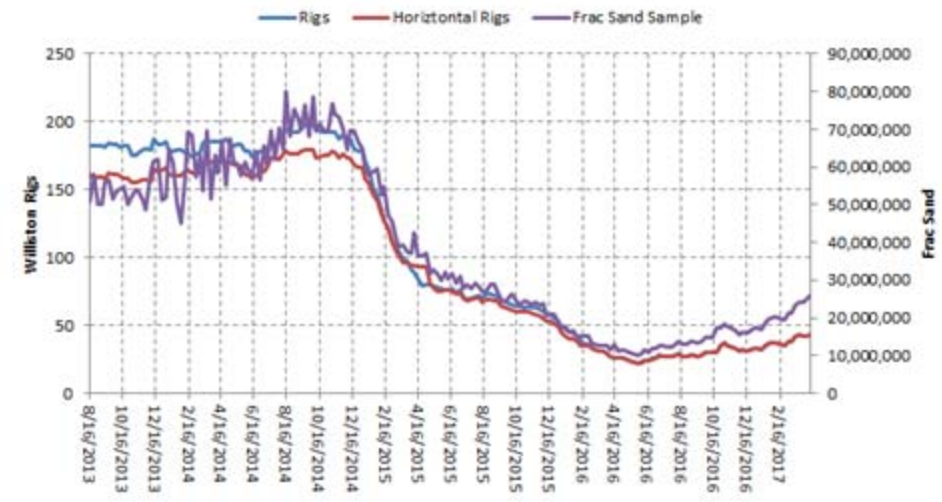


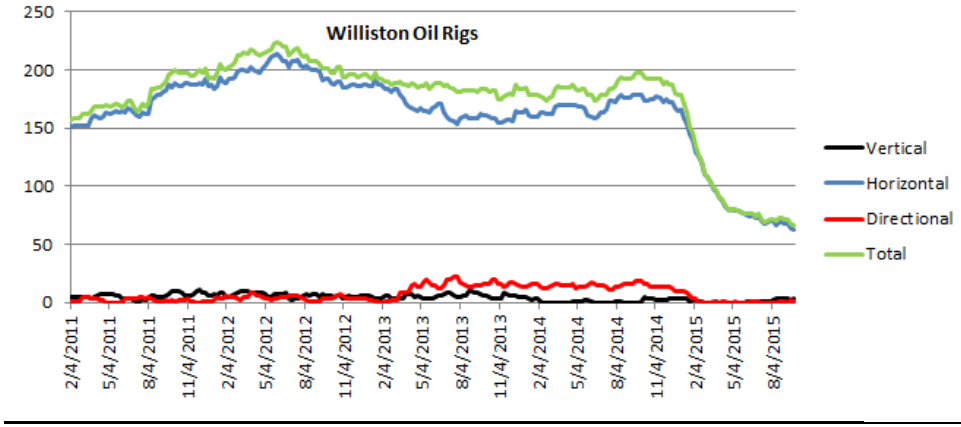
2017 Oil Production by Basin

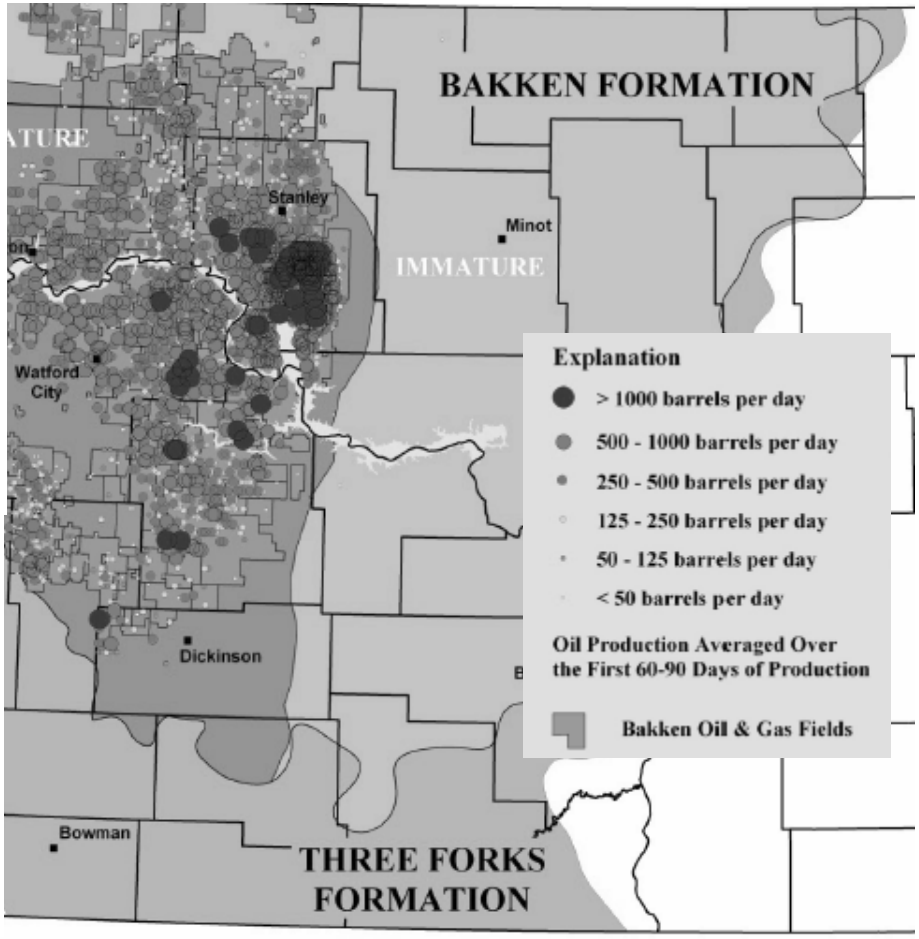
Bakken – Williston Detail

2017 Frac Sand Example

Frac Sand Examples – Bakken (Production stabilizing to higher)

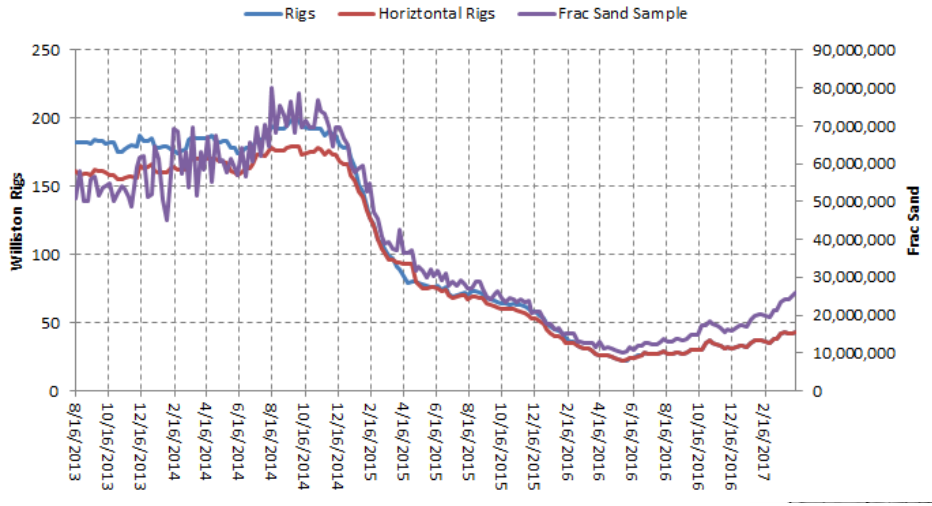




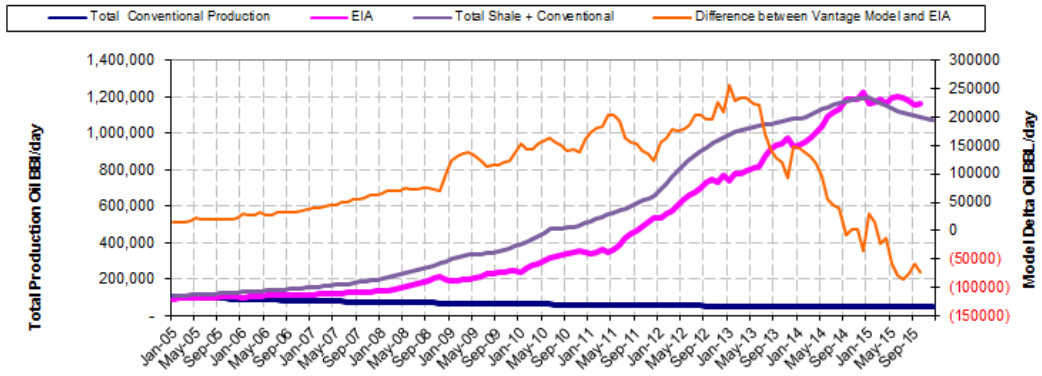


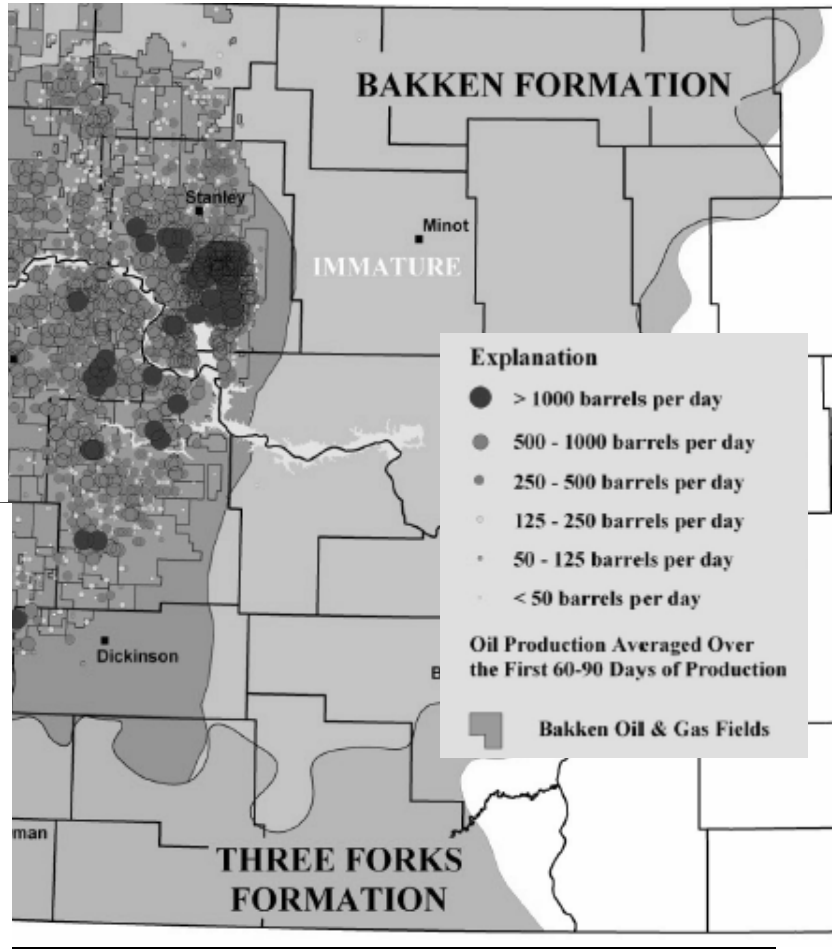
2017 Frac Sand Example

Frac Sand Examples – Bakken (Production stabilizing to higher)



Vantage Total North Dakota Production Model compared to EIA



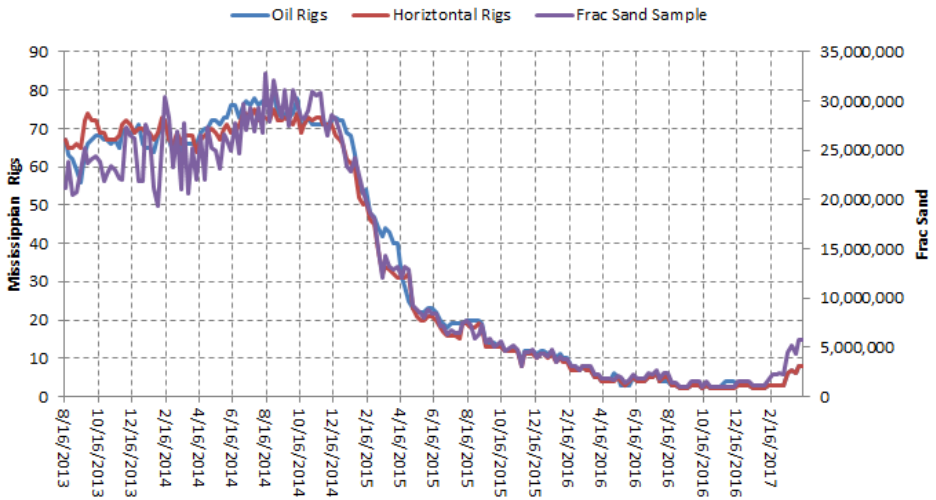


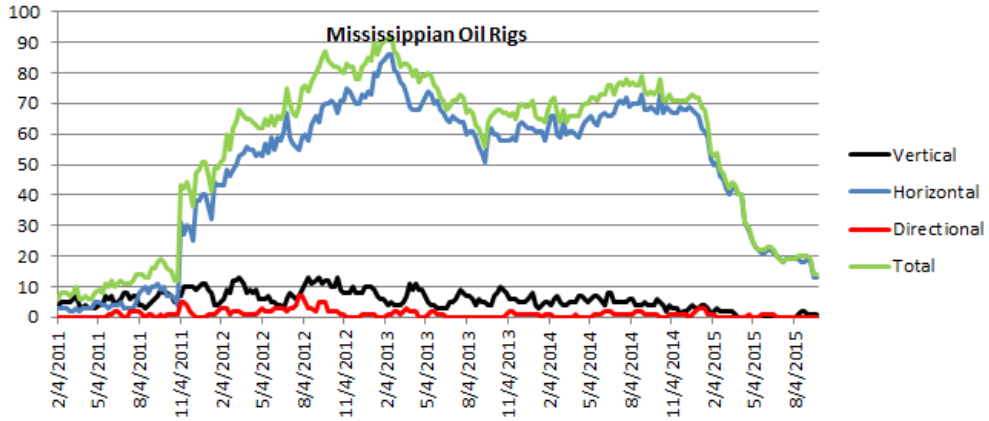
2017 Oil Production by Basin

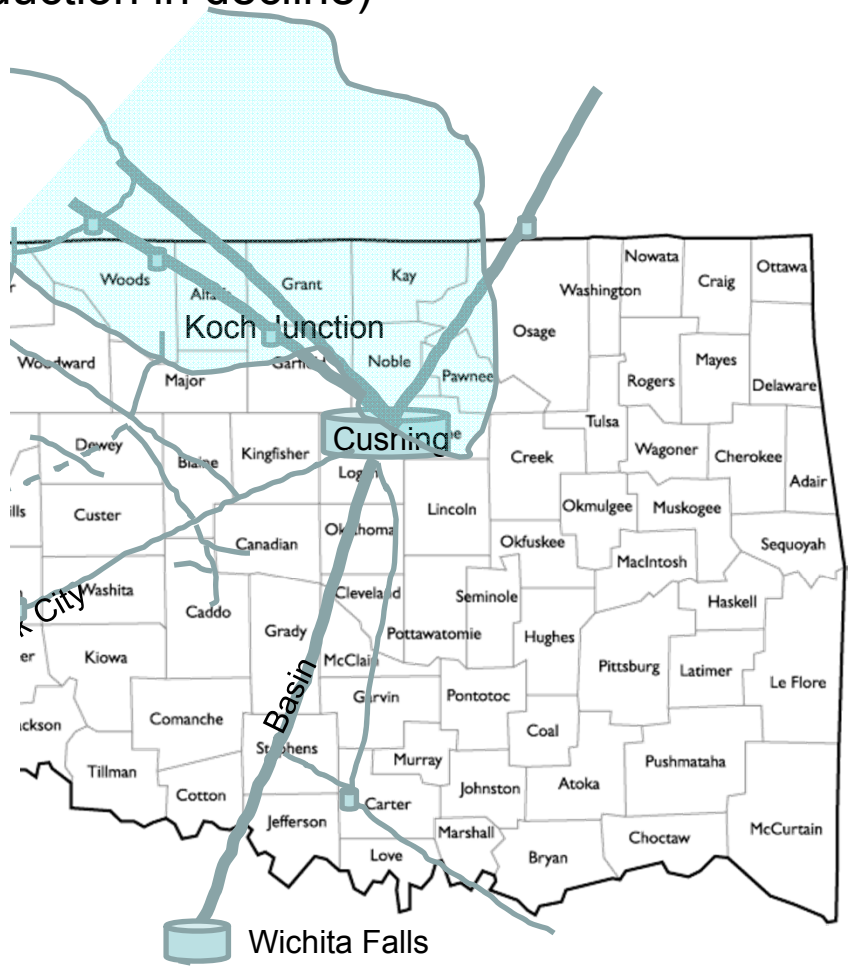
Oklahoma – Granite Wash - Mississippian

2017 Frac Sand Example

Frac Sand Examples – Mississippian (Production in decline)

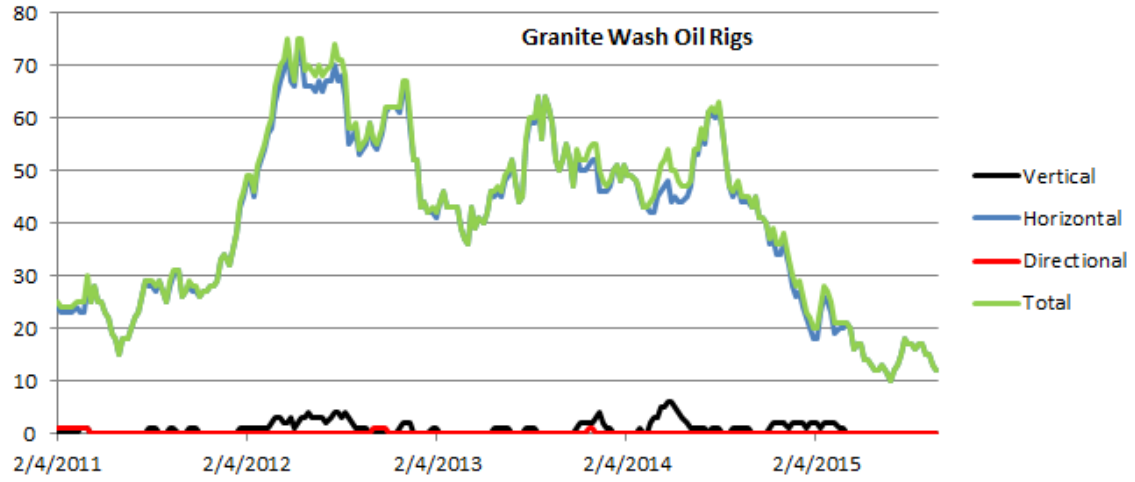


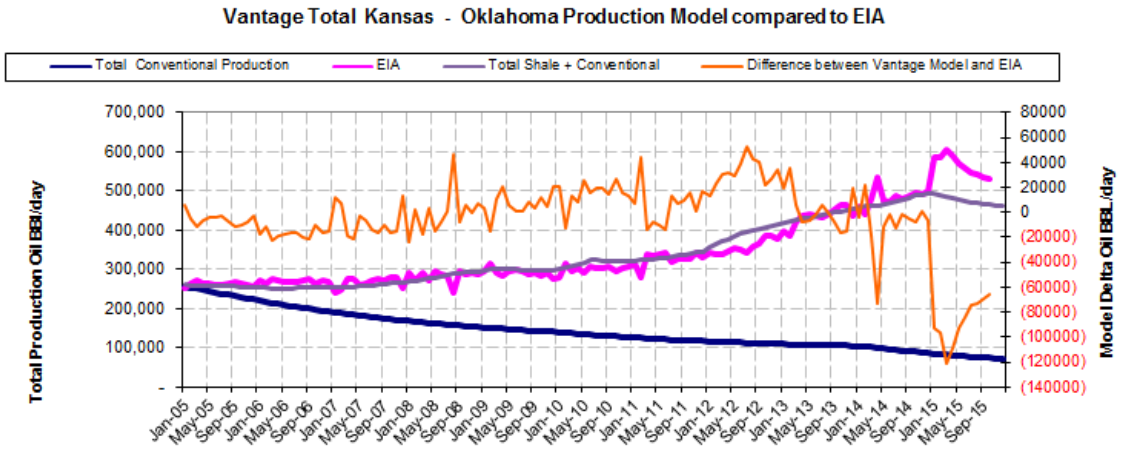


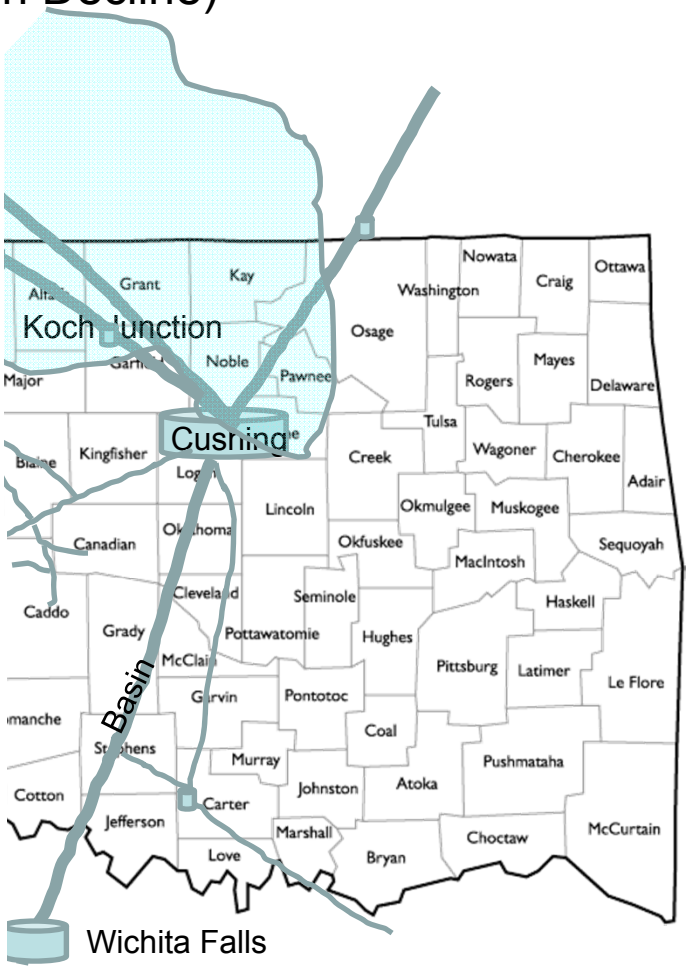


2017 Frac Sand Example

Frac Sand Examples – Mississippian (Production in Decline)





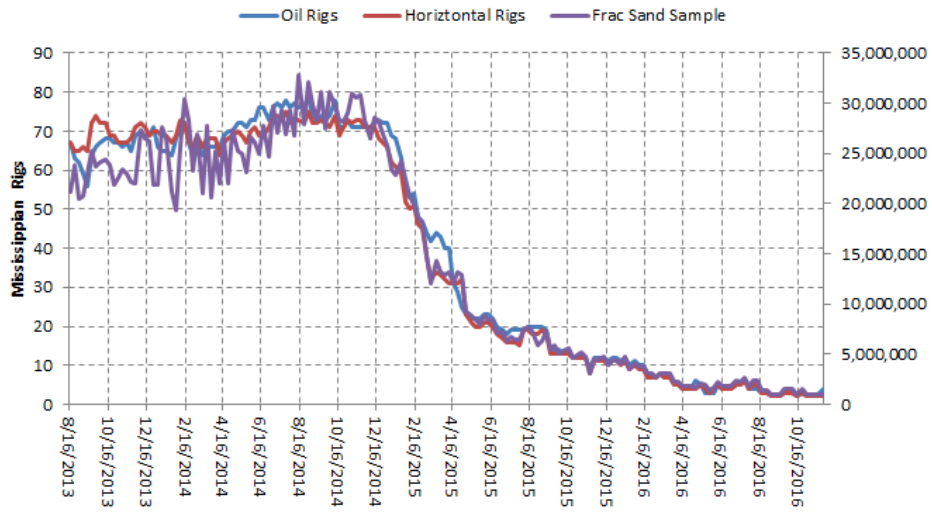


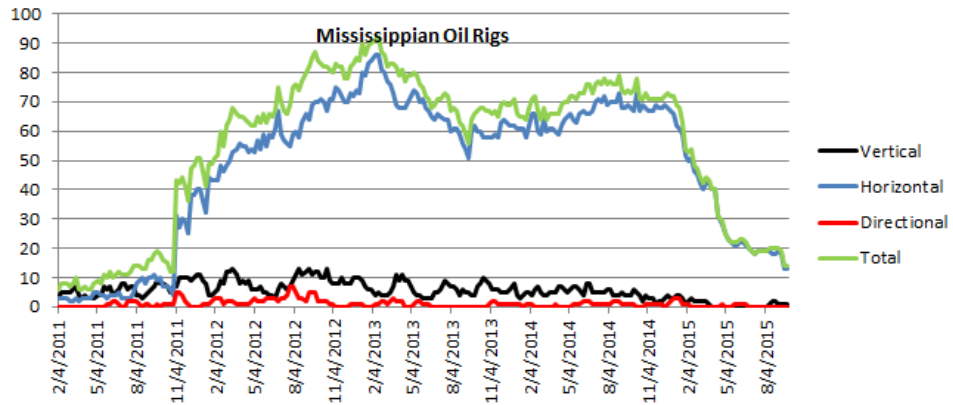
2017 Oil Production by Basin

Kansas - Mississippian

2017 Frac Sand Example

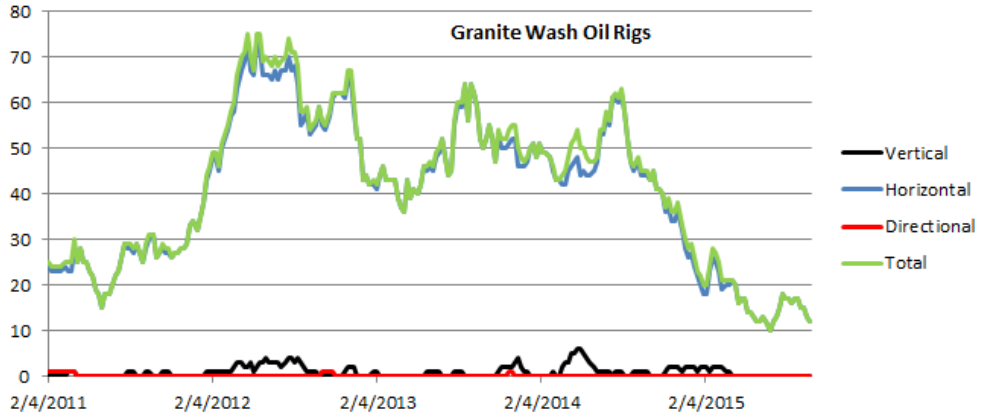
Frac Sand Examples – Mississippian (Production in decline)

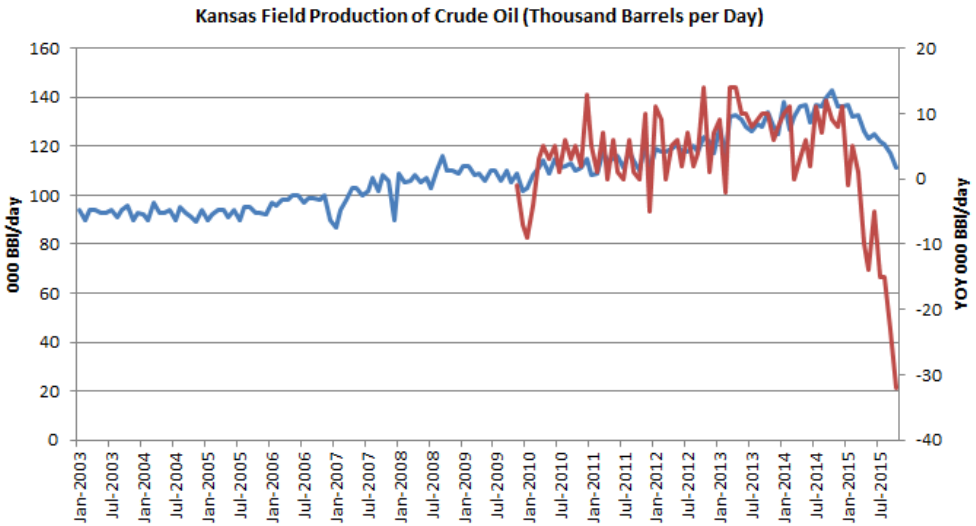




2017 Frac Sand Example

Frac Sand Examples – Mississippian (production in decline)



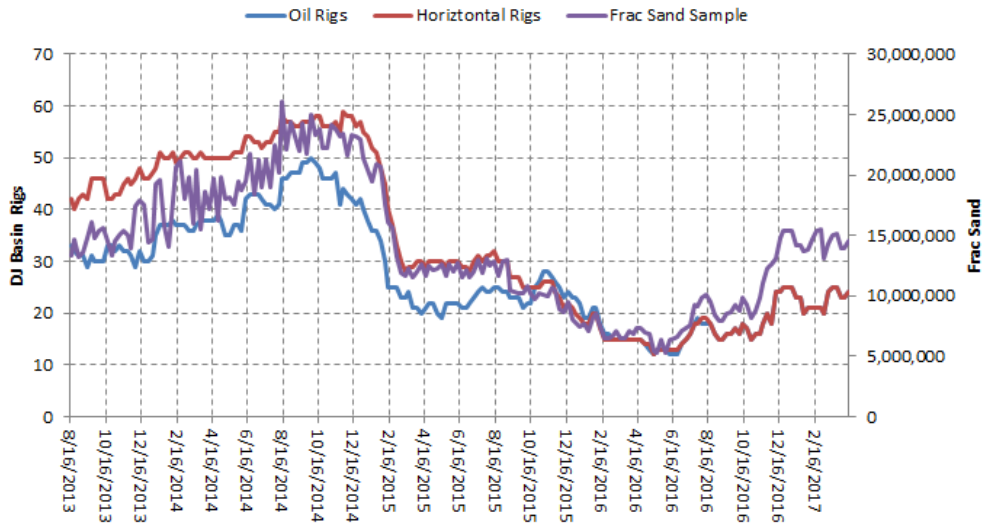


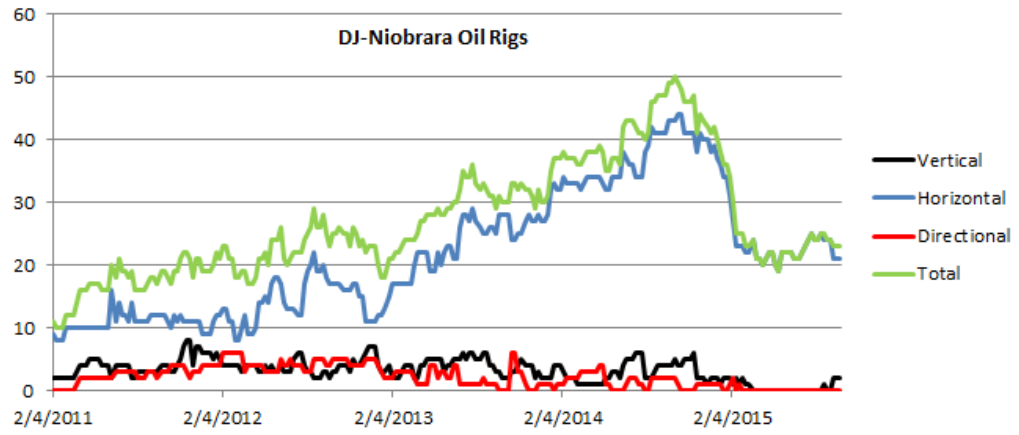
2017 Oil Production by Basin

Rockies – Wyoming – Utah - Colorado

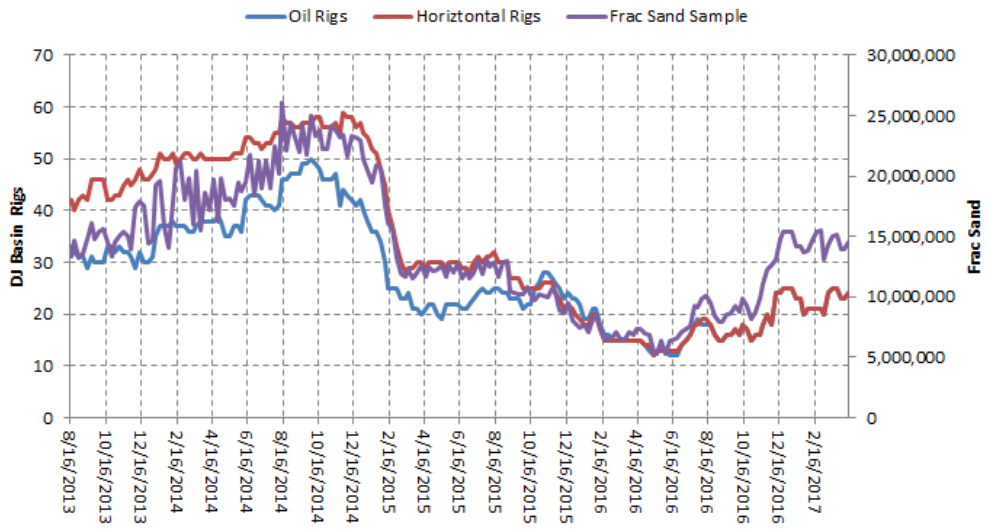
2017 Oil Production by Basin

Frac Sand Examples – DJ Basin (Production stabilizing to higher)

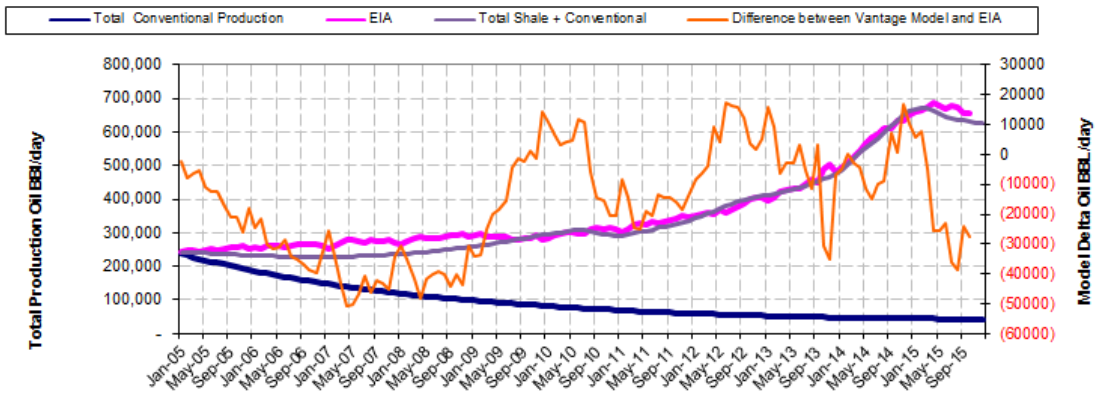


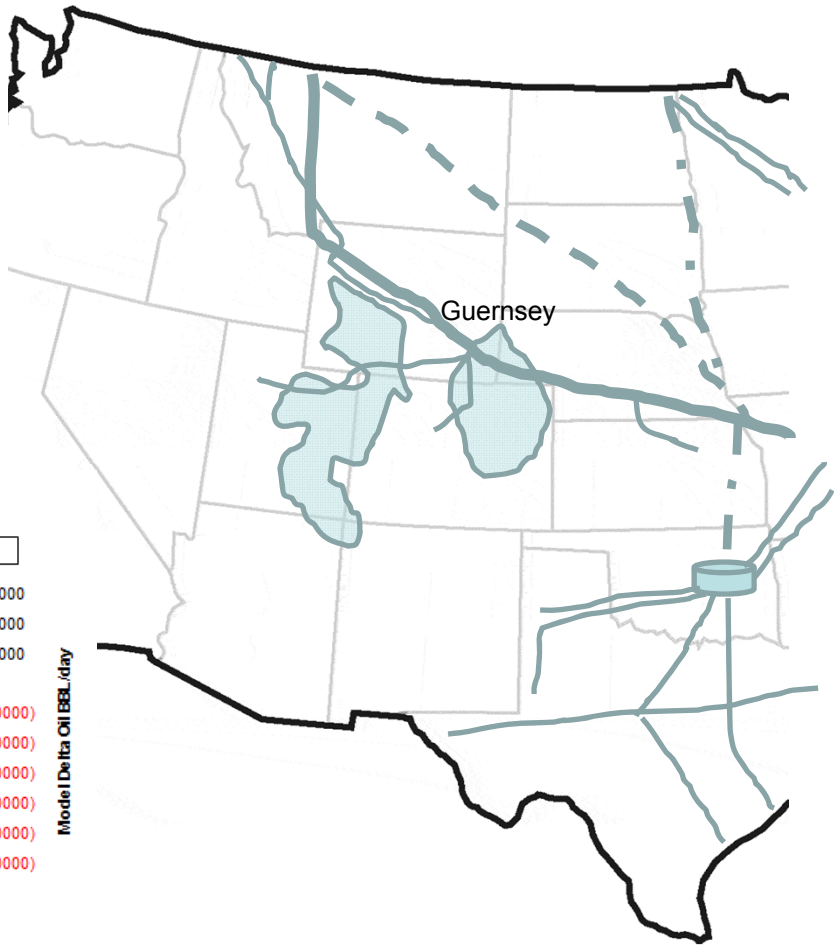


2017 Oil Production by Basin



Vantage Total DJ Niobrara Production Model compared to EIA

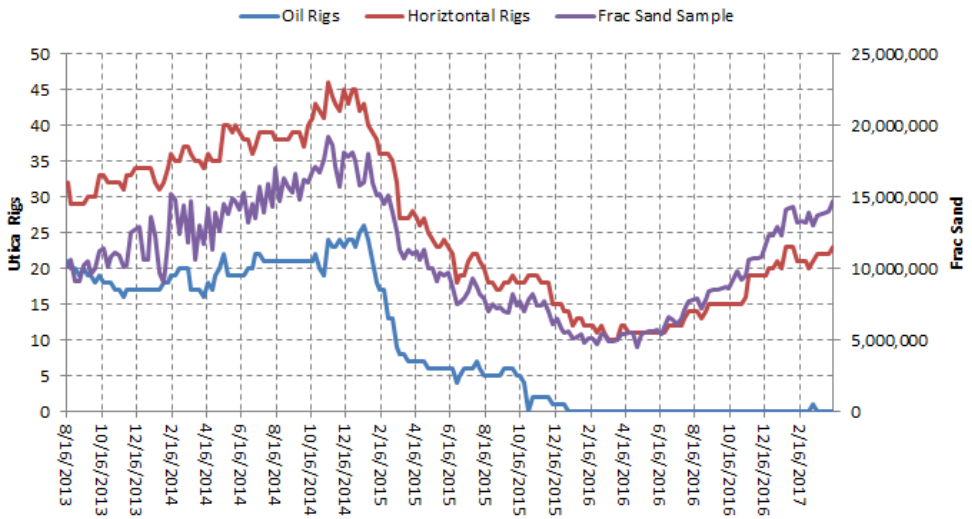


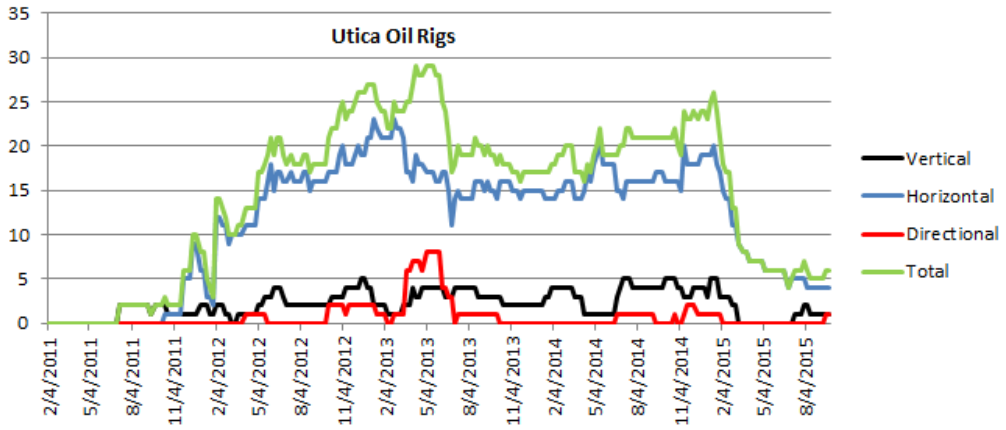


2017 Oil Production by Basin

Utica - Ohio

2017 Oil Production by Basin





2017 Oil Production by Basin