Causeway

Causeway Capital Management LLC

The Balance between Crude Oil Supply and Demand

August 14, 2015

"Formula for success: rise early, work hard, strike oil."

- J. Paul Getty

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EXECUTIVE SUMMARY

The Current Supply/Demand Imbalance

From peak to trough, crude oil prices plunged about 60% in 2014 – and slid again recently, testing lows of earlier this year. Excess supply, combined with a market expectation for softening global demand, has weighed on oil prices. Unlike past behavior, the Organization of the Petroleum Exporting Countries (OPEC) has not cut production to support the market price. This appears to us as a rational strategy. The resulting lower crude oil prices should spur demand and constrain uneconomic supply. We currently expect that the self-correcting mechanism inherent in the crude oil markets will likely bring about a recovery in oil prices by 2017.

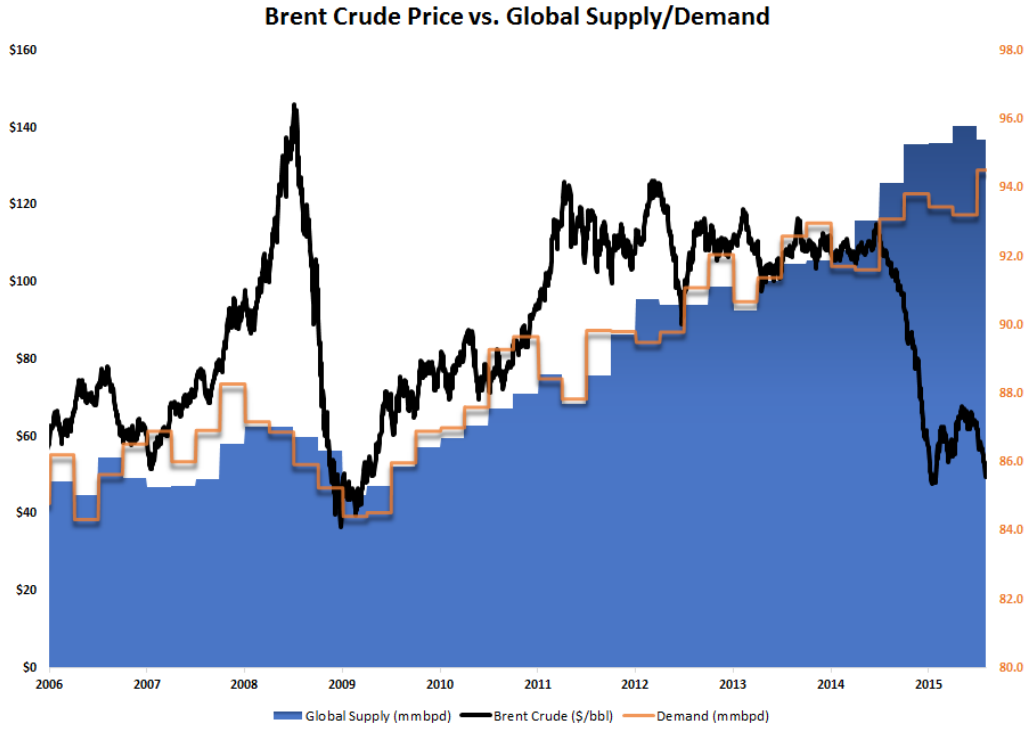
At present, crude oil demand has turned up, perhaps responding to lower prices. This year, according to the International Energy Agency (IEA) July 2015 forecast, global demand growth will rise to 1.4 million barrels per day (mmbpd) after a weak 2014 when it registered only 700 thousand barrels per day (kbpd). Given the progressive downward revisions in the IEA demand forecast for 2016, we expect that annual demand growth will hold steady at least 1 mmbpd. This base level of demand assumes pressure from energy efficiency in Organisation for Economic Co-Operation and Development (OECD) regions and the drag from slowing growth in non-OECD regions. China remains the greatest risk in terms of near-term demand as their economic pace decelerates.

Global supply will likely continue to outpace demand this year due to significant production increases from OPEC and the lag in production slowdown from both US shale and from Non-OPEC, Non-US project deliveries. We believe the recent drop in oil prices will elicit the supply reaction that Saudi Arabia was seeking, and will result in significant market tightening in 2016 as non-OPEC production declines.

Due to the current oversupply situation exacerbated by an uncertain amount of Iranian barrels returning to the market in 2016, crude oil prices may drift below marginal cost of the swing US shale producers for the next 12-18 months.

However, if it becomes clear that non-OPEC supply has diminished, a Brent crude oil price of $70 will be required to incentivize sufficient US shale production to balance the market in 2017 and beyond. After 2017, an even higher oil price may be required to incentivize new supply projects to offset base declines outside of OPEC and the United States.

The Saudis are seeking an equilibrium in which demand growth remains steady and non-OPEC supply grows at a pace that meets some, but not all of this demand.



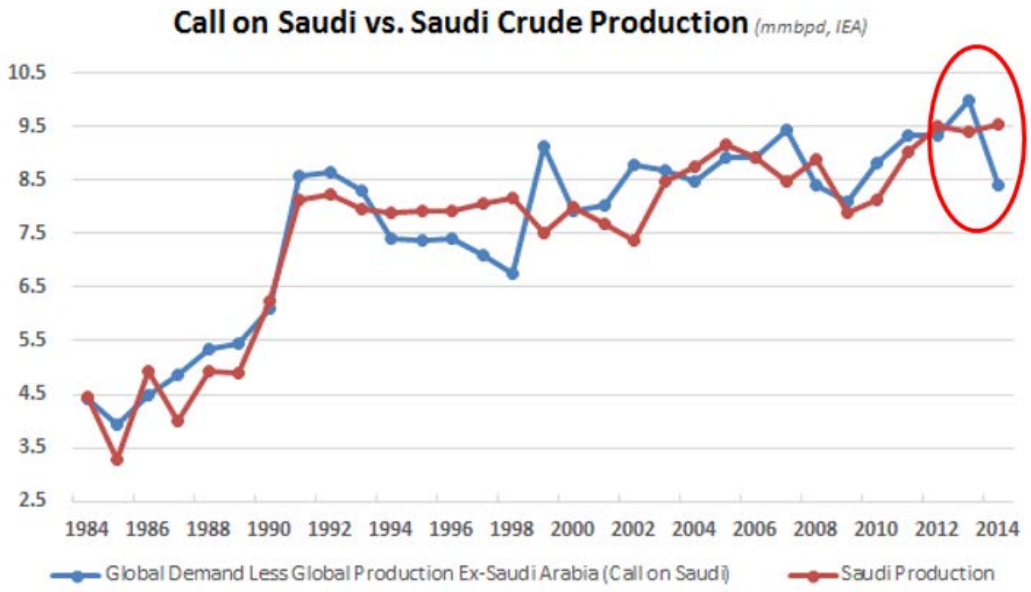
Source: International Energy Agency, Bloomberg

Updated Causeway Forecast Assumptions

TOPIC	PRIOR TO 2015	WHAT HAS HAPPENED	CURRENT
1) Demand	• With demand stable historically, supply has largely determined oil prices.	• Over long periods of time, global oil demand has been very stable. However, 2014 was weak, and emerging market concerns raise downside risks for future demand. • 2015 and 2016 should exhibit a recovery in demand, helped in part by the stimulus generated by lower oil prices.	• Although the supply side has the greatest uncertainty, downside risks to demand include ineffective monetary policy and economic stagnation. • In lower oil price scenarios, price elasticity should spur greater oil consumption.
2) Supply	• Only OPEC has enough spare capacity to boost supply materially. • The inevitable decline in well production (decline rate) constrains supply. • Disruptions, operational or geopolitical, occur frequently, posing price risk to upside.	• US shale expansion continues, and could be a sustainable source of global production growth, *contingent on the level of oil prices.* • Further upside risks to supply have emerged from countries within OPEC, namely Iran and Iraq. In addition, non-OPEC, non-US production has proved resilient. • The Saudis have declared that they will not cut production to balance the market, and will instead allow the lower oil price to balance the market.	• The oil price should settle at a level at which global production growth meets demand growth, without requiring the Saudis to cut production significantly to balance the market. • In the medium-term, we should also assume increases in supply within OPEC, from countries such as Iran. • The potential for supply outages, and low OPEC spare capacity relative to demand, implies upside price risk in the event of disruptions.
3) Oil pricing mechanism	• Since spare capacity is low, i.e., a "normal" market, oil should price between the marginal cost of supply ($90) and the marginal cost of demand ($130).	• $110/bbl oil incentivized non-OPEC supply growth that exceeded global demand by nearly 2 mmbpd. • This extreme level of oversupply would have required an unacceptably large production cut by the Saudis in order to balance the market. • Because of this near-term oversupply, marginal cost no longer represents a relevant floor to the oil price. • As the shortest-cycle source of supply, US shale is now the most relevant swing producer. • Marginal costs of all sources of supply are adjusting to a lower oil price, but not all cost savings are sustainable.	• The current market expectation is for oversupply to persist for at least the next two years. • However, we believe the market will tighten faster than expected if Brent remains at – or below $50/bbl. • The Saudis will likely aim for an equilibrium where OPEC supply growth satisfies some, but not all, of global demand. • The equilibrium price must incentivize supply growth from both US shale and other sources to satisfy demand growth and replace production declines. • We believe the oil price will approach this equilibrium price, estimated at $70/bbl Brent, within the next two years.

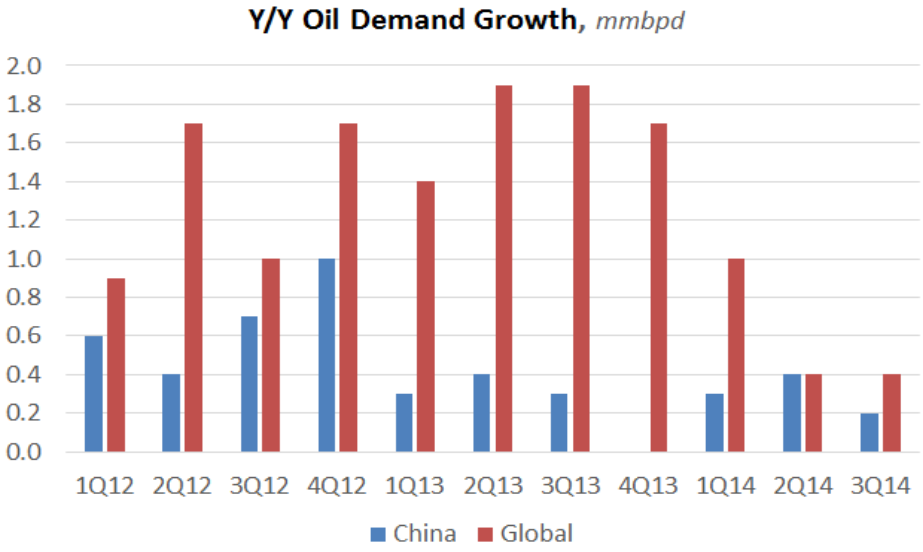
Recent Developments

As the largest OPEC producer, Saudi Arabia has historically adjusted its crude oil production to balance the global market. We estimate that the significant decrease in the "call on Saudi" production last year would have required an approximately 2 mmbpd unilateral cut in production from the Saudis to balance the market. Instead, the Saudis chose to retain market share, and let the global market reach equilibrium.



Source: International Energy Agency

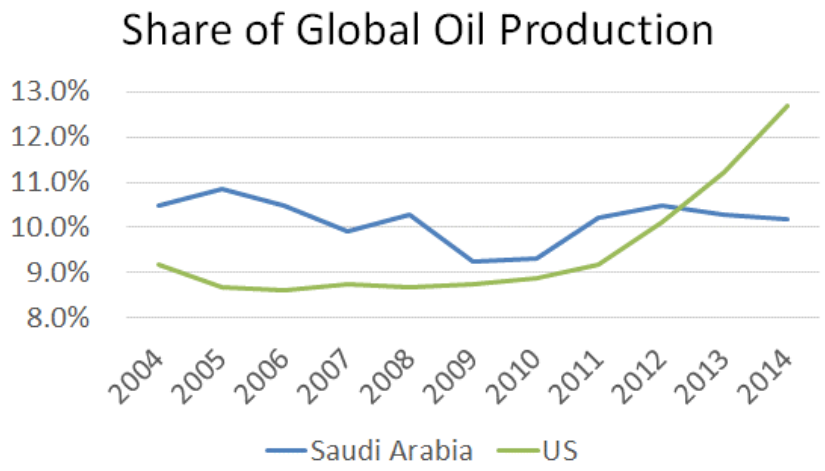
We may never know the precise reason(s) for OPEC's failure to reduce supply in 2014. However, based on expert reports, we suspect that the Saudis were highly concerned about waning global oil demand, particularly in China. With lower oil prices creating more incentive for usage, structural (rather than temporary) demand may rise.



Source: International Energy Agency

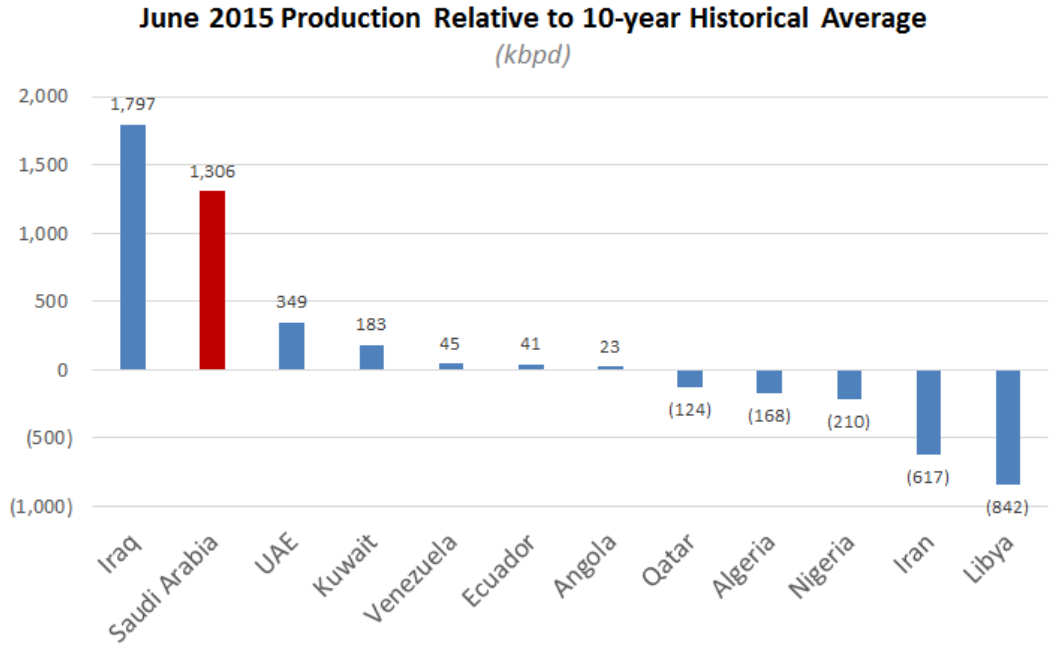
Other motivation for the Saudi inaction may have come from their concern about new sources of supply. In the last two years, US shale gained a significant share of the global oil supply market at the expense of OPEC and the Saudis. An OPEC cut

supporting higher prices may have incentivized even greater volumes of shale production, leading to even further share losses to US oil & gas producers.



Source: International Energy Agency

We also recognize the importance of intra-OPEC compliance. In the past, the Saudis have adjusted their production in excess of their share in order to balance the oil market, while other OPEC members enjoy higher production. With Libya, Iran and several other members producing substantially less than their historical averages, the Saudis may have received considerable pressure to cut production, allowing other members to take market share.



Source: Bloomberg; each bar represents the difference between the country's June 2015 production and its 10-year historical average.

Other motivations to allow a slump in crude oil prices may include geopolitical concerns. A prolonged period of low oil prices would exacerbate the economic headwinds facing adversaries and competitors such as Iran, Russia, and ISIS, and others.

Supply/Demand Scenarios

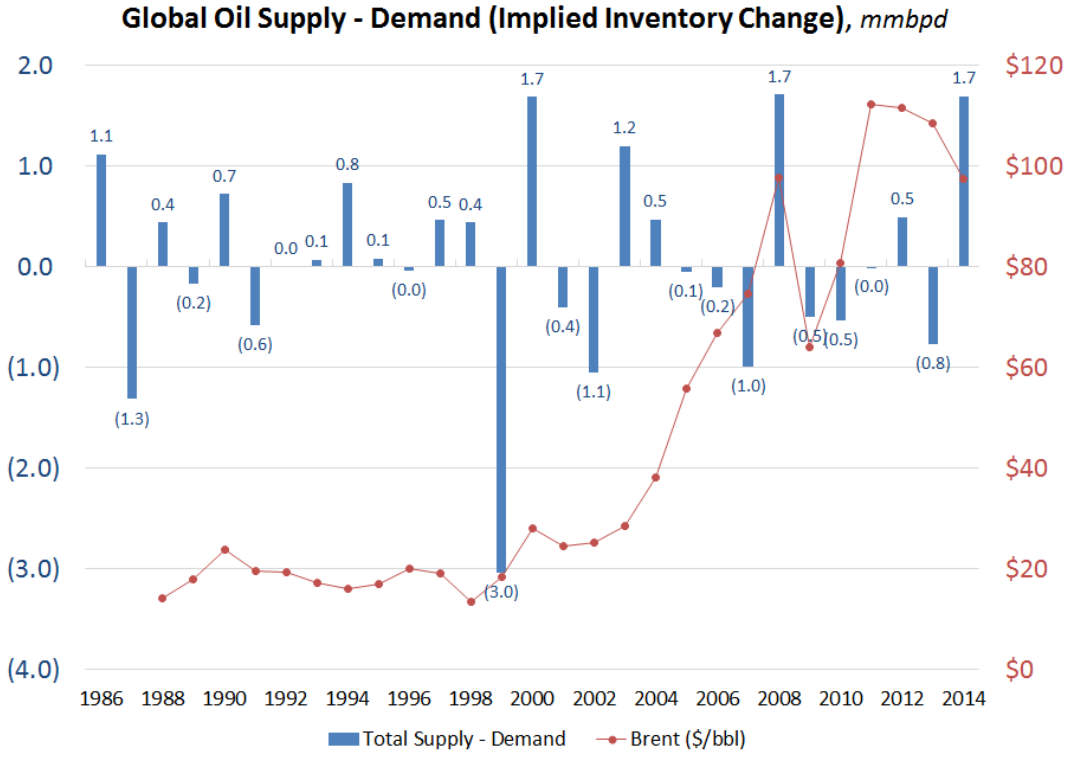
- In 2015, we expect global oil supply growth to exceed demand growth by 1.1 mmbpd, as non-OPEC grows by 1.0 mmbpd (consistent with current IEA forecasts) and OPEC and the Saudis increase production by 1.5 mmbpd (consistent with year-to-date growth through June).
- Under the current market forward curve for Brent crude oil of $55/bbl and $60/bbl in 2016 and 2017, we believe activity in the United States will respond to the deteriorating project returns and production will decline by 400 kbpd.

Scenario 1 - Market Forwards

	2012	2013	2014	2015E	2016E	2017E
Average Brent ($/bbl)	**$112**	**$109**	**$100**	**$55**	**$55**	**$60**
Demand (mmbpd) (A)	**1.8**	**1.3**	**0.7**	**1.4**	**1.0**	**1.0**
US	1.1	1.1	1.6	0.9	(0.4)	0.0
Non-US	(0.2)	0.3	0.9	0.1	(0.3)	(0.4)
Non-OPEC	0.9	1.4	2.5	1.0	(0.7)	(0.4)
Non-Saudi	0.9	(0.7)	(0.3)	0.8	0.6	0.3
Saudi	0.5	(0.1)	0.1	0.7	0.0	0.0
OPEC	1.4	(0.8)	(0.2)	1.5	0.6	0.3
Supply (mmbpd) (B)	**2.3**	**0.5**	**2.3**	**2.5**	**(0.1)**	**(0.1)**
Supply - Demand (B - A)	**0.5**	**(0.8)**	**1.6**	**1.1**	**(1.1)**	**(1.1)**

Source: Causeway Research, International Energy Agency

- We believe that the forward curve has misjudged the likely 2016 supply/demand dynamics. As a 1.1 mmbpd inventory reduction becomes apparent, we believe the oil price will rise to reflect the rapidly tightening market. As shown below, a 1.1 mmbpd tightening of the supply/demand balance would be a very large move historically.



Source: International Energy Agency

- We believe oil prices should rise to a level that would support the market, restoring equilibrium in 2017 and beyond. We see an equilibrium scenario as demand growing 1 mmbpd coupled with 500 kbpd of US shale supply growth, flat non-US,

non-OPEC supply and 500 kbpd of OPEC supply, comprised of 200 kbpd from Saudi Arabia (maintaining/growing its market share) and 300 kbpd from other OPEC (principally Iran and Iraq).

- We estimate that $65 West Texas Intermediate (WTI) or $70 Brent is the price required for US shale to add 500 kbpd without stretching capital expenditures unreasonably beyond cash flow. There is likely upside to this price assumption as there may be additional higher-cost offshore barrels that need to be incentivized to offset the declining base and keep non-US, non-OPEC production flat.

Scenario 2 - Market Balance

	2012	2013	2014	2015E	2016E	2017E	Balance
Average Brent ($/bbl)	**$112**	**$109**	**$100**	**$55**	**$60**	**$65**	**$70**
Demand (mmbpd)	**1.8**	**1.3**	**0.7**	**1.4**	**1.0**	**1.0**	**1.0**
US	1.1	1.1	1.6	0.9	(0.2)	0.4	0.5
Non-US	(0.2)	0.3	0.9	0.1	(0.3)	(0.4)	0.0
Non-OPEC	0.9	1.4	2.5	1.0	(0.5)	0.0	0.5
Non-Saudi	0.9	(0.7)	(0.3)	0.8	0.6	0.3	0.3
Saudi	0.5	(0.1)	0.1	0.7	0.0	0.0	0.2
OPEC	1.4	(0.8)	(0.2)	1.5	0.6	0.3	0.5
Supply (mmbpd)	**2.3**	**0.5**	**2.3**	**2.5**	**0.1**	**0.3**	**1.0**
Supply - Demand	**0.5**	**(0.8)**	**1.6**	**1.1**	**(0.9)**	**(0.7)**	**0.0**

Source: Causeway Research, International Energy Agency

- In our downside scenario, we use the IEA's forecast for US shale growth of 300 kbpd in 2016, though we believe this forecast is a remnant of when oil prices were expected to be in excess of $65/bbl in 2016, as it would have required a quick ramp up of the rig count in the second half of 2015, which is unlikely now with WTI below $50.
- In this scenario, we also assume higher growth out of OPEC (perhaps Iran growing at the high end of the 500-700 kbpd forecast coupled with Iraq and other OPEC growth), which will push the market further into oversupply in 2016 and defer any price recovery by an additional year.

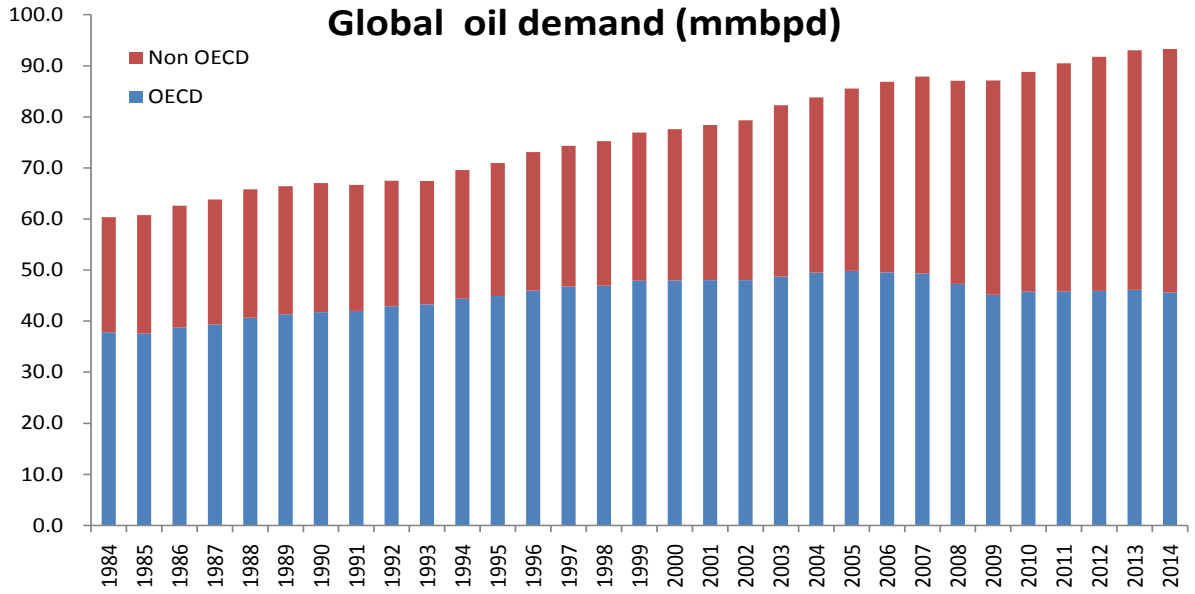
Scenario 3 - Downside

	2012	2013	2014	2015E	2016E	2017E
Average Brent ($/bbl)	**$112**	**$109**	**$100**	**$55**	**$50**	**$55**
Demand (mmbpd)	**1.8**	**1.3**	**0.7**	**1.4**	**1.0**	**1.0**
US	1.1	1.1	1.6	0.9	0.3	0.0
Non-US	(0.2)	0.3	0.9	0.1	0.0	0.0
Non-OPEC	0.9	1.4	2.5	1.0	0.3	0.0
Non-Saudi	0.9	(0.7)	(0.3)	0.8	1.0	0.3
Saudi	0.5	(0.1)	0.1	0.7	0.0	0.0
OPEC	1.4	(0.8)	(0.2)	1.5	1.0	0.3
Supply (mmbpd)	**2.3**	**0.5**	**2.3**	**2.5**	**1.3**	**0.3**
Supply - Demand	**0.5**	**(0.8)**	**1.6**	**1.1**	**0.3**	**(0.7)**

Source: Causeway Research, International Energy Agency

OIL DEMAND FUNDAMENTALS

Global oil demand has grown at a steady compound annual growth rate (CAGR) of 1.4% and 1.1% in the past 30 and 10 years, respectively.

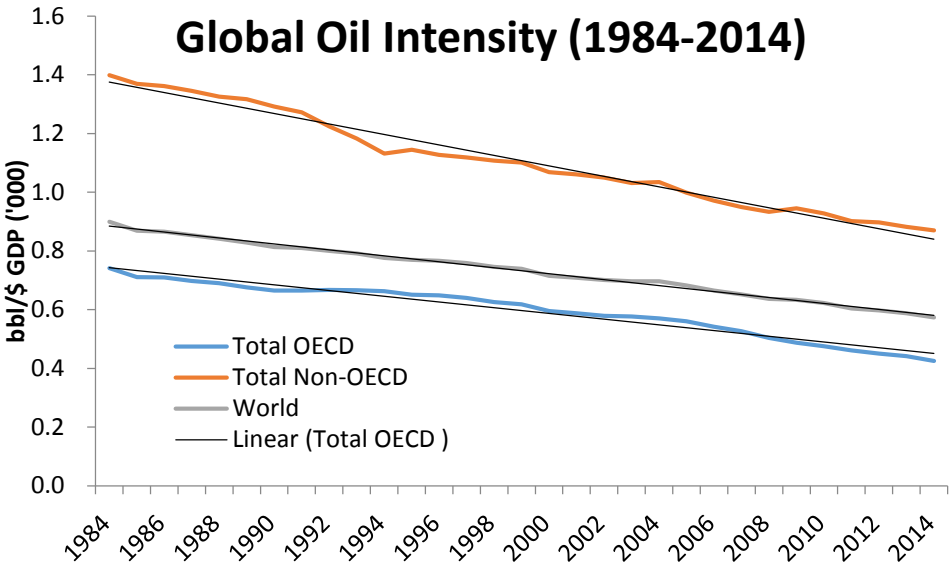


Source: International Energy Agency

Oil intensity has historically trended down at a very consistent pace

Global oil intensity[1]

Oil intensity has declined moderately at a modest pace over time. Historically, oil intensity tends to be more stable in developed economies, whereas for emerging economies, depending on the stage of development, it tends to run at high levels and diminishes as the economy matures.

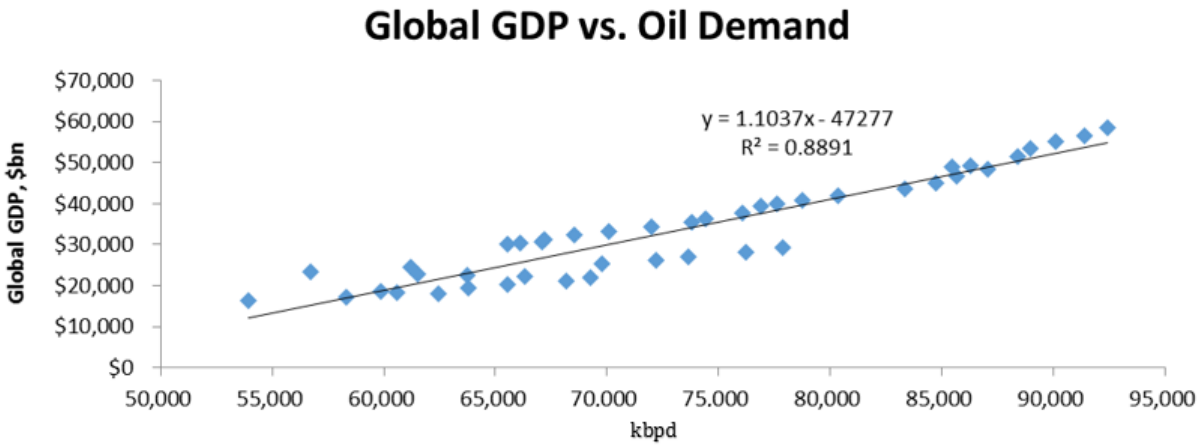


Source: Causeway Research, International Energy Agency, Goldman Sachs Research

[1] Oil demand (bbl) / Real GDP ($)

Relationship between oil consumption and global gross domestic product (GDP)

Global oil demand is highly correlated to economic expansion. GDP growth and energy intensity of growth remain much higher in the emerging economies/markets (EM), which should continue as the middle class in those countries expands. Other factors besides GDP that drive oil demand, to a lesser extent, include the level of crude prices, the local price of gasoline and weather.



Source: Causeway Research, International Energy Agency, Goldman Sachs Research

Oil demand growth varies across geographies.

Though world oil demand has grown steadily historically, there have been marked differences between oil demand growth trends of OECD and non-OECD markets. OECD growth of oil demand has been, at best, flat to a slight decline, exhibiting a 30-year CAGR of 0.6% and 10-year CAGR of -0.8%, and non-OECD demand growth has accelerated, with a 30-year CAGR of 2.5% and 10-year CAGR of 3.4%.

The key driver of oil demand growth has been transportation.

Transportation is the main source of long-term global demand growth.

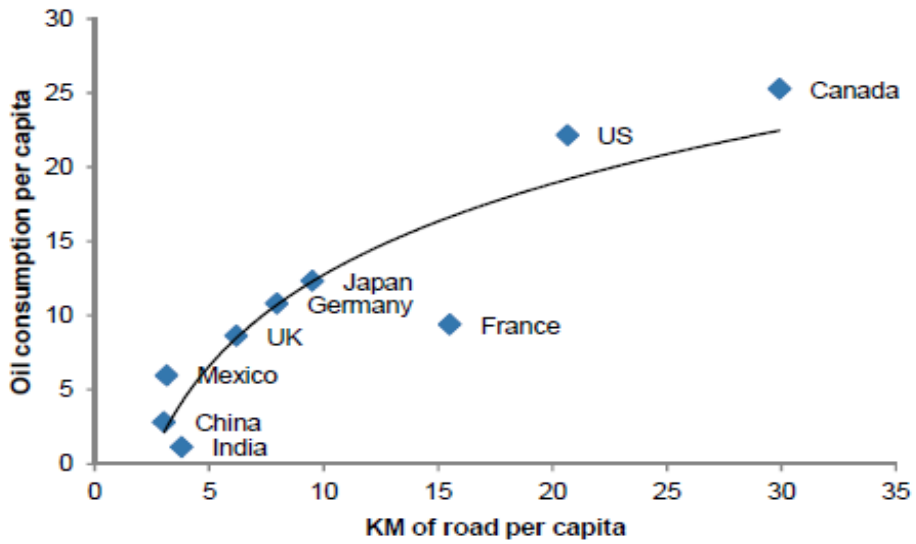
- From 1971-2012, transportation accounted for roughly 90% of demand growth, and represented 64% of total global oil demand in 2014.
- With the highest energy density of the major fossil fuels, oil products are well-suited for transport, where weight and volume are constraints.

Structural and behavioral differences between countries drive per capita consumption, perhaps more than income.

- Miles of road per capita is a very good indicator of per capita oil consumption, which does not favor North America conservation.
- Infrastructure investment and small changes in per capita consumption in Asia can have an outsized impact on global demand.

Per Capita Oil Consumption vs. Miles of Road Per Capita

(Y-axis: oil consumption per capita; x-axis: km of road per '000 people)



Source: CIA World Factbook, IEA, Morgan Stanley Commodity Research

Transportation demand can be hard to ration without a step change in technology or substitution. Transportation remains vital for economic growth. Lower population densities and structural differences in North America make closing the efficiency gap with Europe and Japan highly unlikely.

KEY CONSIDERATIONS FOR OIL DEMAND

Key driver of growth: non-OECD, especially China

According to the IEA, non-OECD countries constituted 51% of oil demand in 2014, up from about 37% in 2000. China led global demand growth, with demand doubling from 4.6 mmbpd in 2000 to over 10 mmbpd in 2014. China represented 11% of global demand in 2014, and over the past ten years has accounted for 20% of global demand growth.

Emerging markets should continue to drive demand growth in the future:

- EM per capita consumption remains low, especially in China and India[2] and incomes are rising.
- GDP growth and energy intensity of growth (GDP multiplier) remain much higher in EM, which should continue as the middle class expands.
- Growth is coming off a large base, providing more per barrel growth even if growth rates slow in percentage terms.
- The mix of product demand growth may be shifting to more crude oil-intensive uses.

Sensitivity to Non-OECD and Chinese economic weakness

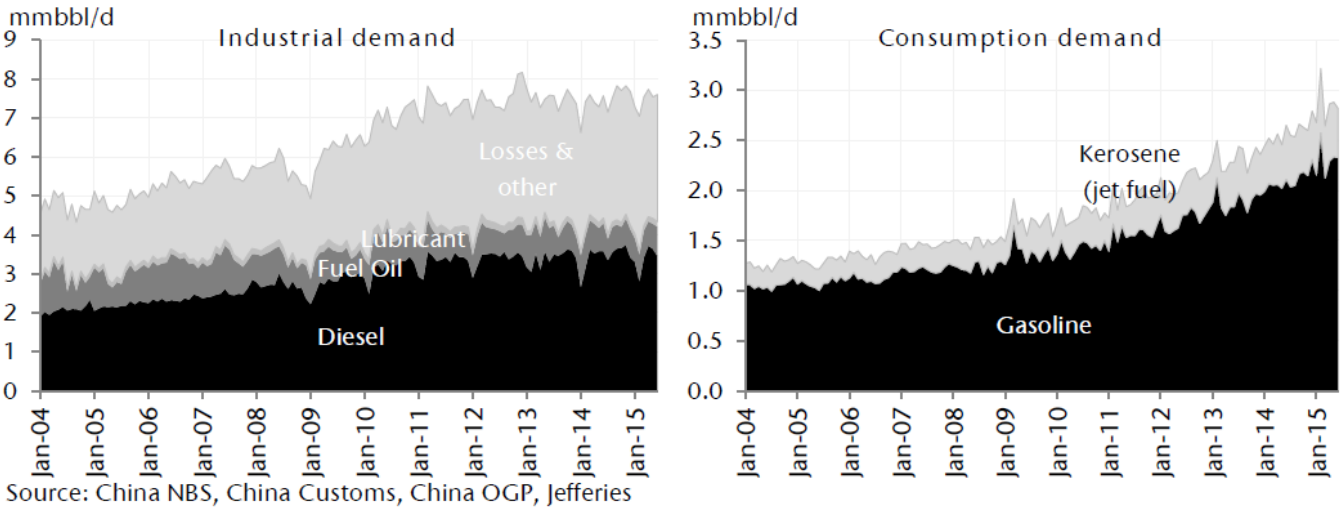
The IMF's expectation for real GDP growth in developing economies is expected to be in the range of 4.7%-5.3% from 2015 to 2020. For China, the range is 6-7% for the respective period. Again, applying the GDP multiplier of 0.5, a 1 percentage point drop in non-OECD economies as a whole would result in a decline of 245 kbpd. If Chinese GDP were to decline by 1 percentage point, oil demand in China would likely shrink by 50 kbpd.

However, we believe the latest data will show that non-OECD and Chinese end demand for crude oil remains robust and is above our estimated run rate, despite a consensus bleak view on the economy.

As China's economy rebalances toward services (from manufacturing and construction) and consumption (from investment), new patterns of resource consumption develop. Diesel demand increased 1.3% year-over-year in the first half of 2015, in line

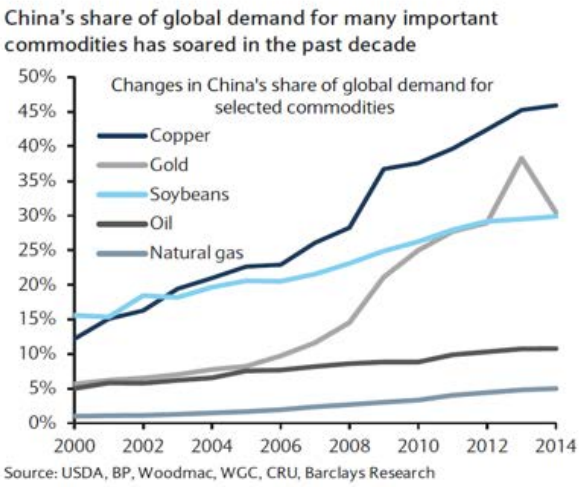
[2] India oil demand was less than half of China at 37% in 2014.

with electricity demand and decoupled from GDP growth. In 2013 and 2014, diesel consumption growth was -0.1% and 1.5%. Chinese gasoline and kerosene demand, on the other hand, increased 12.1% and 17.4% respectively. Chinese gasoline consumption has grown at an annual rate of approximately 10% since 2011.

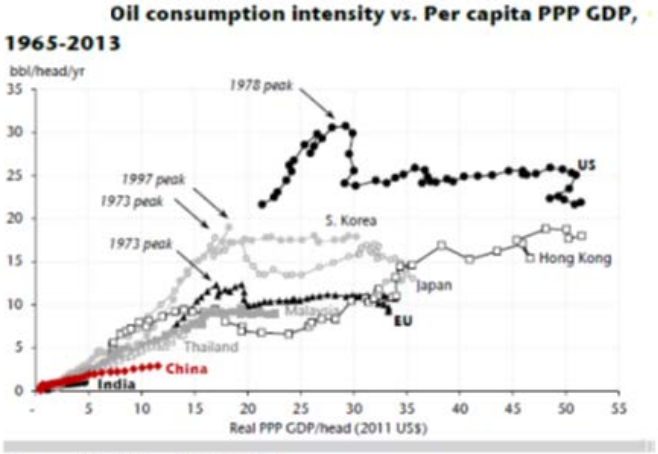


Source: China NBS, China Customs, China OGP, Jefferies

The following chart also demonstrates that relative to other commodities, oil has not enjoyed the same magnitude of Chinese growth, following a steadier path associated with changes in consumption, rather than investment. Following the maturation path of other countries, China has just started in terms of oil consumption intensity per unit of economic output.



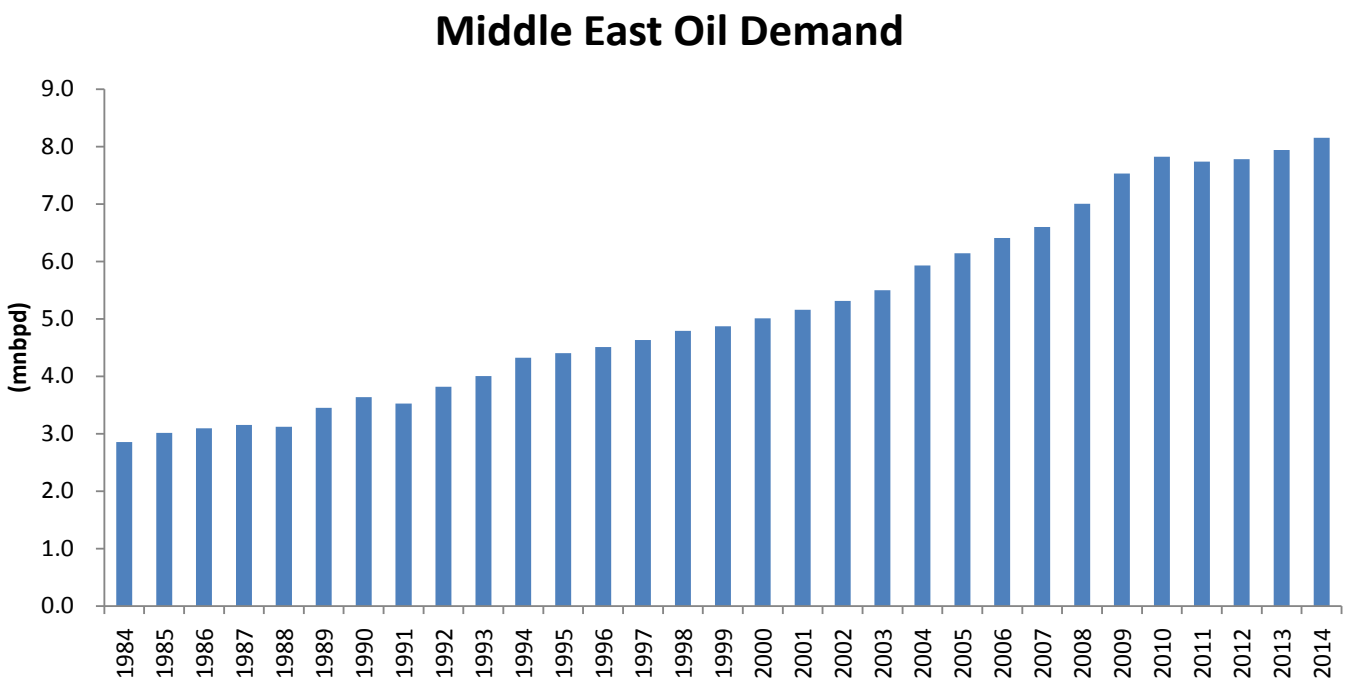
Source: USDA, BP, Woodmac, WGC, CRU, Barclays Research



Source: World Bank, BP, Jefferies

Middle East oil demand growth

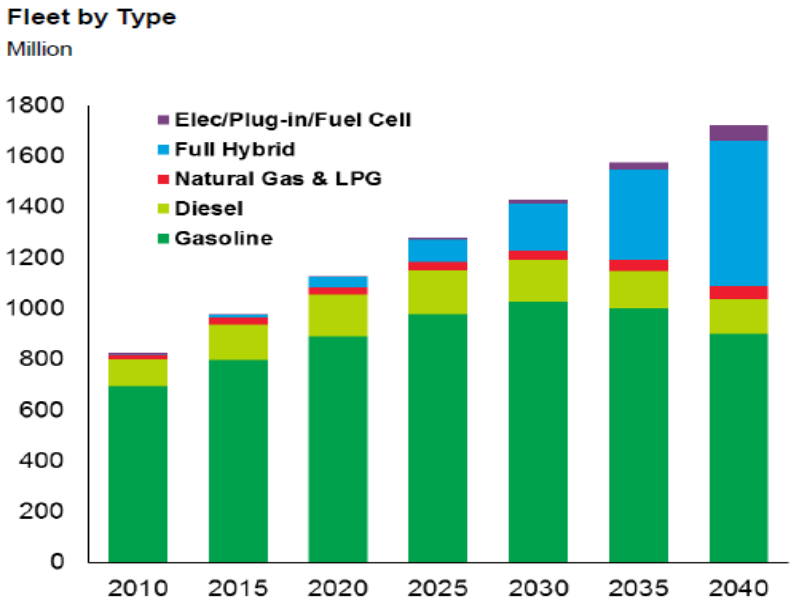
The Middle East comprised 9% of global oil demand in 2014, and has expanded at a 30-year CAGR of 3.6% and at a 10-year CAGR of 3.2%. As an exporting region, the Gulf States have domestic growth closely linked to commodity price levels, and domestic population growth, rather than price, drives oil demand. In a major oil exporting nation, demand elasticity to oil price is subject to distortion from massive subsidies resulting in inefficient use of oil.



Source: International Energy Agency

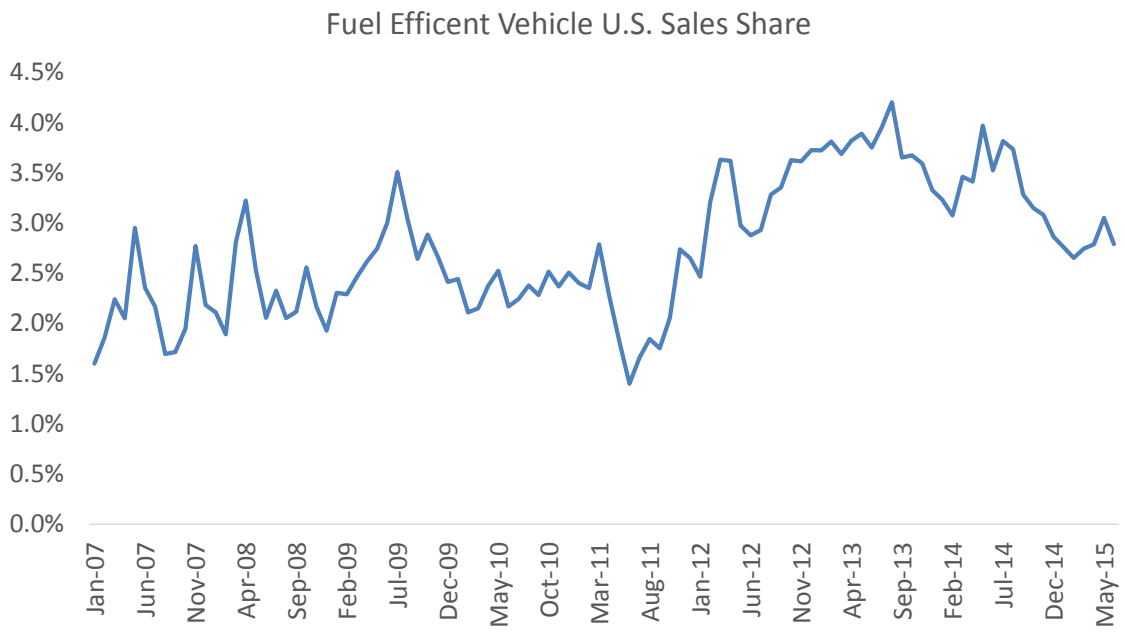
Impact from increase in fuel efficiency

ExxonMobil's forecast this year of fleet mix in the longer term shows that combustion engine technology will ultimately cede share, but will not decrease in absolute terms until 2035.



Source: ExxonMobil

In the US market, electric vehicles (EVs) in 2015 comprised 0.07% of the car fleet, representing 0.4% of new car sales. If EVs were to take up 10% market share of new car sales, this could lead to a 50 kbpd loss of oil demand the first year (loss of -0.6% of oil demand). Even with a 10% market share in new car sales, it would only represent 0.7% of the fleet in the first year. Hybrids represent 1.6% of the fleet and 2.4% of new car sales. The twelve month moving average of hybrids as a percentage of new car sales peaked 3.5% in the fall of 2013, and has fallen to 2.6% in June 2015. EV sales are rising, but remain immaterial in number to change the fleet composition.

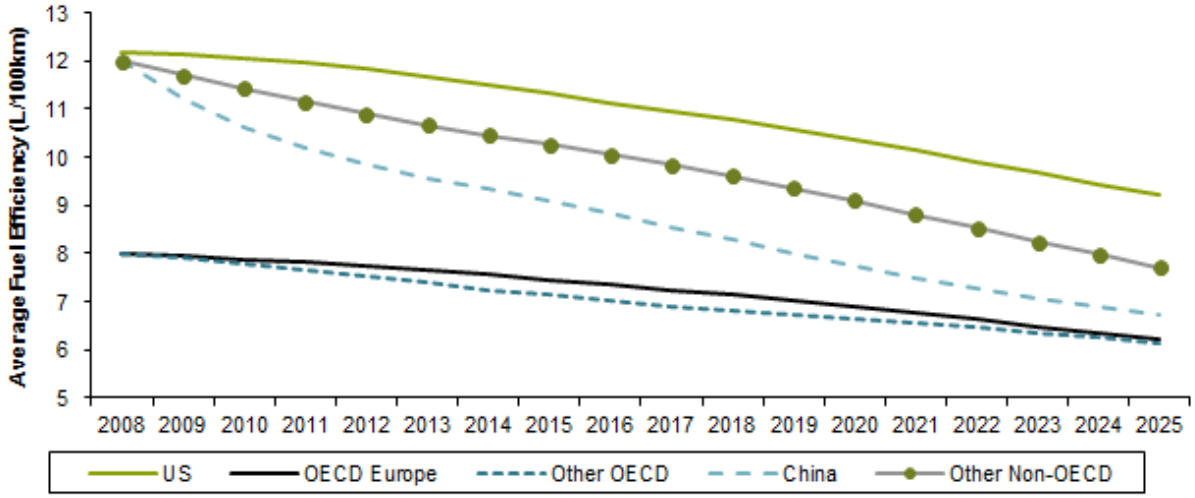


Source: WardsAuto

In order to assess the impact of more stringent Corporate Average Fuel Economy (CAFE) standards, we made the following assumptions:

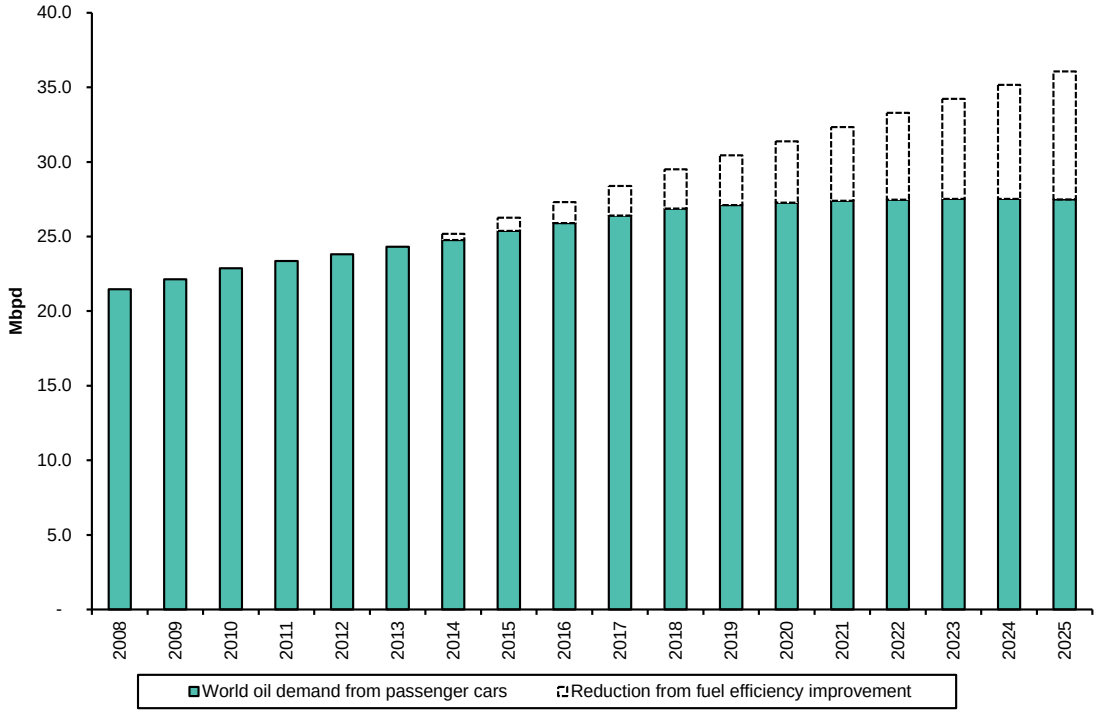
- Efficiency stays the same until the day the vehicles are scrapped. When new vehicles are added to the fleet, they are compliant with the year's CAFE standard (and with actual fuel efficiency of approximately 72% of CAFE standard). For the United States, proposed improvement in fuel efficiency is around 4.1% per annum from 2015 to 2025.
- Scrappage of 6% .

The trend of fuel efficiency over time is as follows:



Source: Bernstein Research

- **Without fuel efficiency improvements, world oil demand from passenger cars would rise to 36.1 mmbpd by 2025**



Source: Bernstein Research

Oil demand price elasticity

Oil price elasticity appears highest in the United States and in emerging Asia as consumption changes in response to price.

In the United States, a 10% change in gasoline prices over less than 12 months has resulted in a 0.5% change in gasoline demand. Over periods longer than a year, a 10% change in gasoline prices results in a 4% change in gasoline consumption. Given that a 10% change in crude prices results in a 5% change in the price of gasoline at the pump (adjusting for refining, distribution, sales, and taxes), this suggests a short-run elasticity of 0.25% (0.5% x 0.5) and a long-run elasticity of 2% (4% x 0.5) in gasoline consumption to a 10% change in crude prices. With gasoline accounting for about 28% of global demand, then the short- and long-run elasticity of global oil demand to a 10% change in crude prices should be c. 0.1% (0.25 x 0.28) and c. 0.5% (2% x 0.28), respectively. For example, a 50% fall in crude prices would be expected to boost global demand by 0.5% in the short run and 2.5% in the long run based on this data.

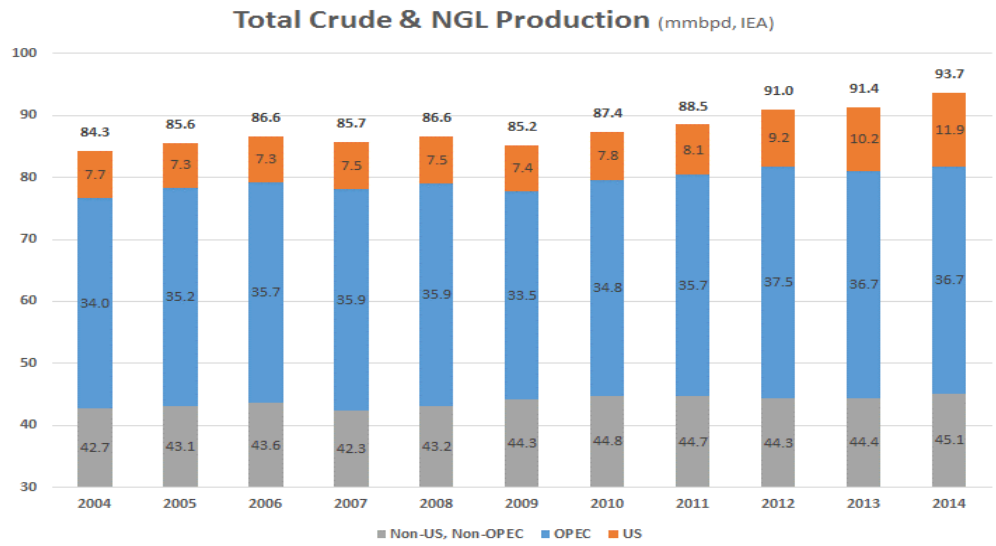
It is worth noting that in the first half of 2015, the strongest area of demand growth came from emerging Asia, specifically China and India, largely in response to low prices. This demand response may, in fact, exhibit just the characteristics that OPEC intended by keeping supply abundant.

INVENTORY LEVELS

OECD days of supply and inventories were a good price signal historically, especially when viewed over longer time periods. However, OECD stocks are now becoming less effective as the non-OECD countries take greater market share. This shifts inventories to regions with opaque data. Revisions are common and result in large miscellaneous-to-balance (i.e. "missing barrels") terms in IEA balances. Oil supply outpaced demand by 3.3 mmbpd in the second quarter 2015, on data supplied by the International Energy Agency, the largest imbalance since the second quarter of 1998. However, OECD inventories built by less than half of that, leaving 167 million bbl of global crude oil barrels to be allocated to emerging countries, or "missing barrels." Historically, most of the missing barrels have come from the IEA underestimating oil demand.

SUPPLY OUTLOOK

- We divide total global oil production into three broad categories: 1) US, 2) OPEC, and 3) Non-US, Non-OPEC. Since 2010, the United States has dominated global growth as production surged from under 8 mmbpd to nearly 12 mmbpd.
- Meanwhile, OPEC production has been largely stable in the 35-37 mmbpd range and Non-US, Non-OPEC production has held about flat at 45 mmbpd.



Source: International Energy Agency

Global Oil Production

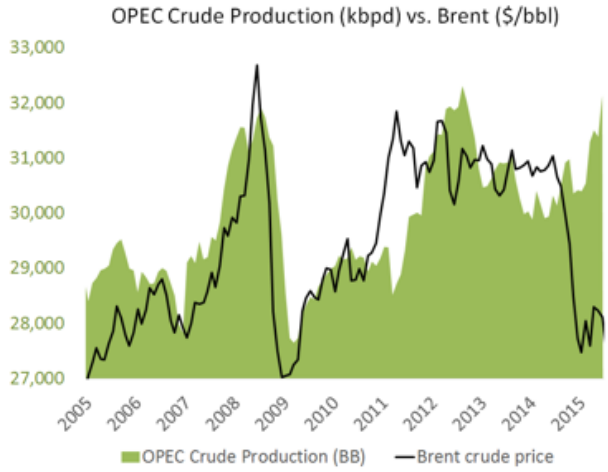
mmbpd

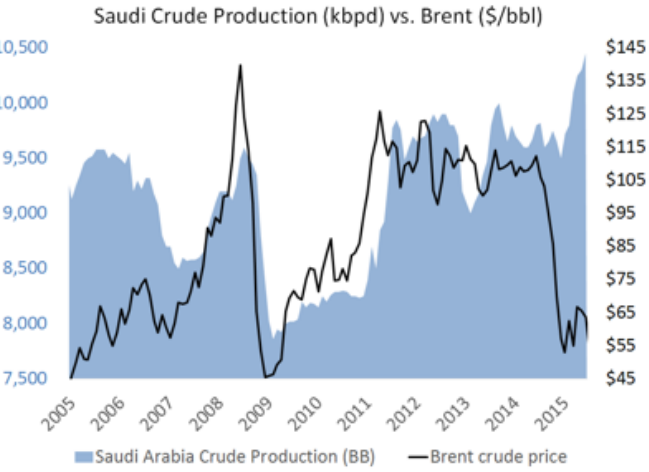
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Saudi Arabia	9.2	8.9	8.5	8.9	7.9	8.1	9.0	9.5	9.4	9.5
Iraq	1.8	1.9	2.1	2.4	2.4	2.4	2.7	3.0	3.1	3.3
Iran	3.9	3.9	4.0	3.9	3.7	3.7	3.6	3.0	2.7	2.8
Angola	0.0	0.0	1.7	1.9	1.8	1.7	1.6	1.8	1.7	1.7
Libya	1.6	1.7	1.7	1.7	1.6	1.6	0.5	1.4	0.9	0.5
Other	13.4	13.3	13.4	12.5	11.3	12.0	12.5	12.7	12.7	12.5
OPEC Crude Oil	29.8	29.7	31.4	31.2	28.7	29.5	29.9	31.3	30.5	30.3
OPEC NGLs	4.2	4.6	4.5	4.7	4.8	5.4	5.8	6.2	6.3	6.4
Total OPEC	34.0	34.3	35.9	35.9	33.5	34.8	35.7	37.5	36.7	36.7
United States	7.3	7.3	7.5	7.5	7.4	7.8	8.1	9.2	10.2	11.9
Russia	9.6	9.8	10.1	10.0	10.2	10.5	10.6	10.7	10.8	10.9
Norway/UK	4.8	4.4	4.2	4.0	3.9	3.5	3.2	2.9	2.7	2.8
Canada	3.1	3.2	3.3	3.3	3.2	3.4	3.5	3.8	4.0	4.3
Brazil	2.0	2.1	2.2	2.4	2.0	2.1	2.2	2.2	2.1	2.4
Mexico	3.8	3.7	3.5	3.2	3.0	3.0	2.9	2.9	2.9	2.8
China	3.6	3.7	3.7	3.8	3.9	4.1	4.1	4.2	4.2	4.2
Other	16.2	16.7	15.3	16.6	18.1	18.3	18.2	17.6	17.7	17.8
Non-OPEC, Non-US	43.1	43.6	42.3	43.2	44.3	44.8	44.7	44.2	44.4	45.1
Total Global Production	84.4	85.3	85.7	86.6	85.2	87.4	88.5	90.8	91.4	93.7
Annual Change										
Saudi Arabia	*0.4*	*(0.2)*	*(0.4)*	*0.4*	*(1.0)*	*0.2*	*0.9*	*0.5*	*(0.1)*	*0.1*
Iraq	*(0.2)*	*0.1*	*0.2*	*0.3*	*0.1*	*(0.1)*	*0.3*	*0.3*	*0.1*	*0.3*
Iran	*(0.1)*	*0.0*	*0.1*	*(0.1)*	*(0.2)*	*(0.0)*	*(0.1)*	*(0.6)*	*(0.3)*	*0.1*
Angola	*0.0*	*0.0*	*1.7*	*0.2*	*(0.1)*	*(0.0)*	*(0.1)*	*0.1*	*(0.1)*	*(0.1)*
Libya	*0.1*	*0.1*	*0.0*	*0.0*	*(0.2)*	*0.0*	*(1.1)*	*0.9*	*(0.5)*	*(0.4)*
Other	*0.5*	*(0.1)*	*0.2*	*(0.9)*	*(1.2)*	*0.7*	*0.5*	*0.1*	*0.0*	*(0.2)*
OPEC Crude	*0.8*	*(0.1)*	*1.7*	*(0.1)*	*(2.6)*	*0.8*	*0.4*	*1.4*	*(0.8)*	*(0.2)*
OPEC NGLS	*0.3*	*0.5*	*(0.1)*	*0.1*	*0.1*	*0.5*	*0.4*	*0.4*	*0.1*	*0.1*
Total OPEC	*1.0*	*0.3*	*1.5*	*0.0*	*(2.4)*	*1.3*	*0.9*	*1.8*	*(0.7)*	*(0.1)*
US	*(0.3)*	*0.0*	*0.1*	*0.0*	*(0.1)*	*0.3*	*0.4*	*1.1*	*1.1*	*1.6*
Russia	*0.3*	*0.2*	*0.2*	*(0.1)*	*0.2*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*
Norway/UK	*(0.4)*	*(0.4)*	*(0.2)*	*(0.2)*	*(0.1)*	*(0.3)*	*(0.4)*	*(0.3)*	*(0.1)*	*0.0*
Canada	*(0.0)*	*0.1*	*0.1*	*(0.1)*	*(0.0)*	*0.2*	*0.1*	*0.2*	*0.3*	*0.3*
Brazil	*0.2*	*0.1*	*0.1*	*0.2*	*(0.3)*	*0.1*	*0.0*	*(0.0)*	*(0.0)*	*0.2*
Mexico	*(0.1)*	*(0.1)*	*(0.2)*	*(0.3)*	*(0.2)*	*(0.0)*	*(0.0)*	*(0.0)*	*(0.0)*	*(0.1)*
China	*0.1*	*0.0*	*0.1*	*0.1*	*0.1*	*0.2*	*0.0*	*0.1*	*0.0*	*0.0*
Other	*0.6*	*0.9*	*(1.5)*	*1.4*	*1.7*	*0.7*	*0.4*	*(0.3)*	*0.2*	*0.3*
Non-OPEC, non-US	*0.7*	*1.0*	*(1.4)*	*1.0*	*1.3*	*1.1*	*0.3*	*(0.2)*	*0.3*	*0.9*
Total Global Production	*1.1*	*0.9*	*0.4*	*0.9*	*(1.4)*	*2.2*	*1.1*	*2.3*	*0.5*	*2.3*

Source: International Energy Agency

Supply: OPEC

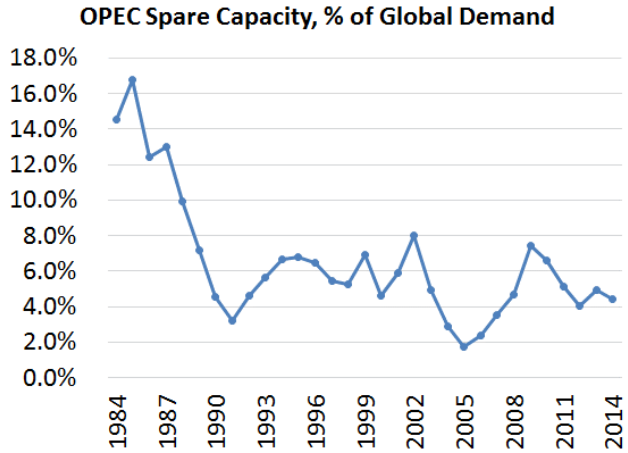
OPEC is a 12-member organization whose members coordinate production to ensure that the oil market remains in balance within a particular price band. OPEC was originally created in 1960 by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela.



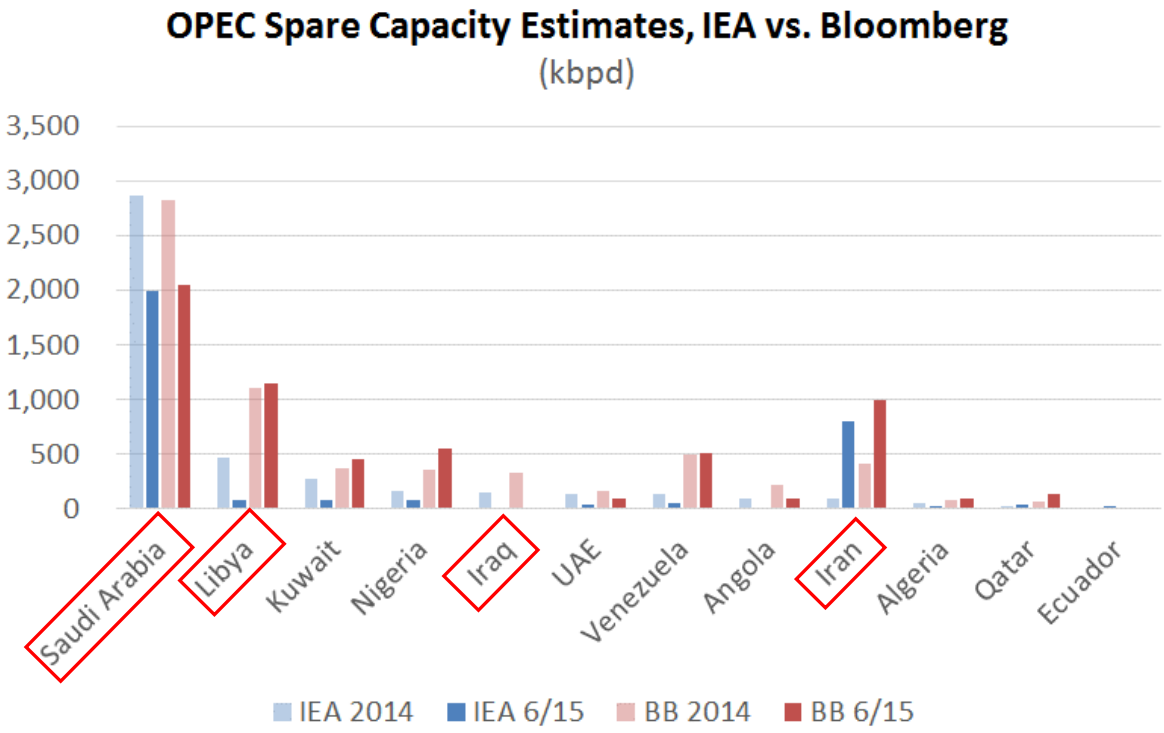


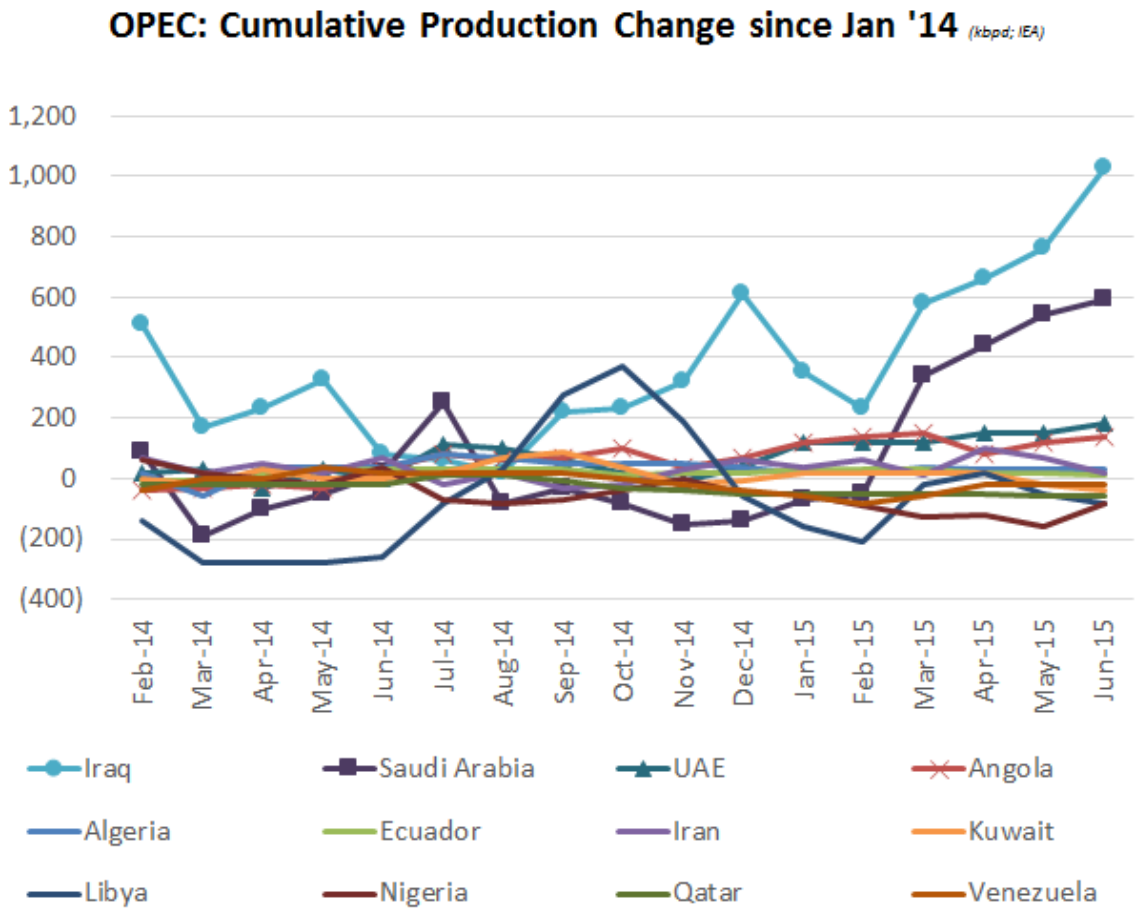
Source: Bloomberg

- To sustain high oil prices, OPEC has historically utilized a quota system to ensure that excess supply or *spare capacity* was withheld from the market. Over the past 20 years, OPEC has acted to reduce quotas after price declines in order to prop up prices, with varying degrees of success. The current production quota of 30 mmbpd has been in place since 2012.
- For the past decade, OPEC spare capacity has been closely watched due to the relationship between spare capacity (relative to global demand) and the global oil price; when spare capacity is low, the oil price has generally been higher (at or above marginal cost).



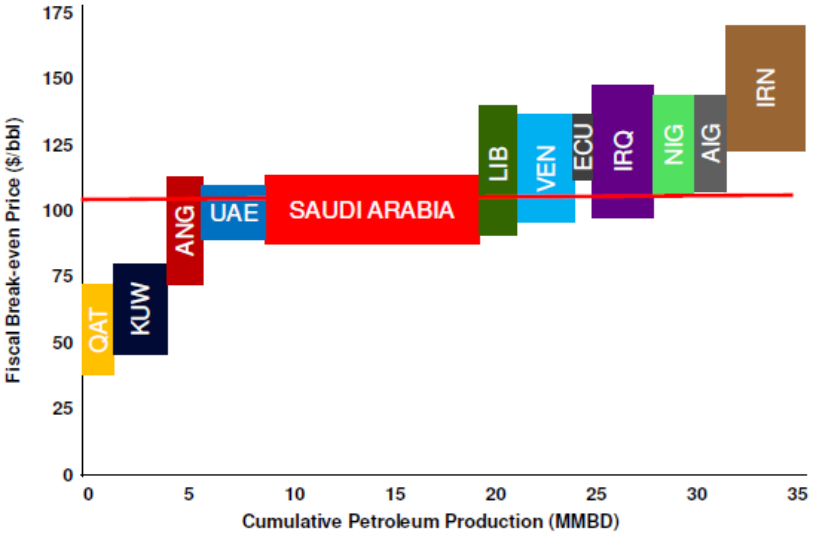
Source: Bernstein Research, International Energy Agency





Source: International Energy Agency

- The economies of the OPEC member countries are highly dependent on oil export revenues. Nearly half of OPEC's production comes from countries which require an oil price over $100 in order for their budgets to break even.
    - The notion that OPEC countries *have* to have higher oil prices is incorrect, as they can run debt-funded budget deficits and constrain spending, but it is clear that these countries are impacted greatly by oil prices and would *like* to have higher oil prices.



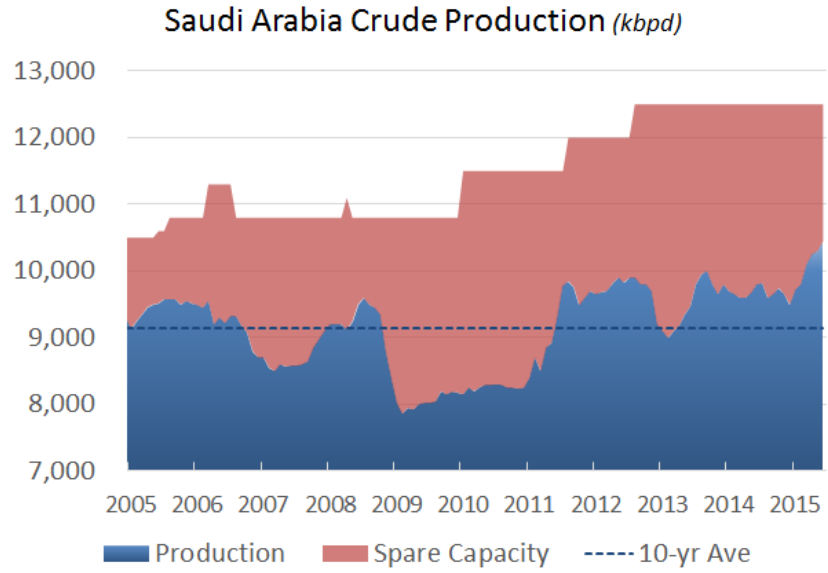
Source: *IMF, ARICORP, Evercore ISI Energy Research*

$p = \alpha^{-1}(EXP - NHFR + yC)/(xQ + yE)$

Oil export price required = price dislocation factor (govt expenditures - non-oil fiscal revenues + hydrocarbon taxation x oil industry costs)/(oil royalty rate x oil production + oil taxes x exports)

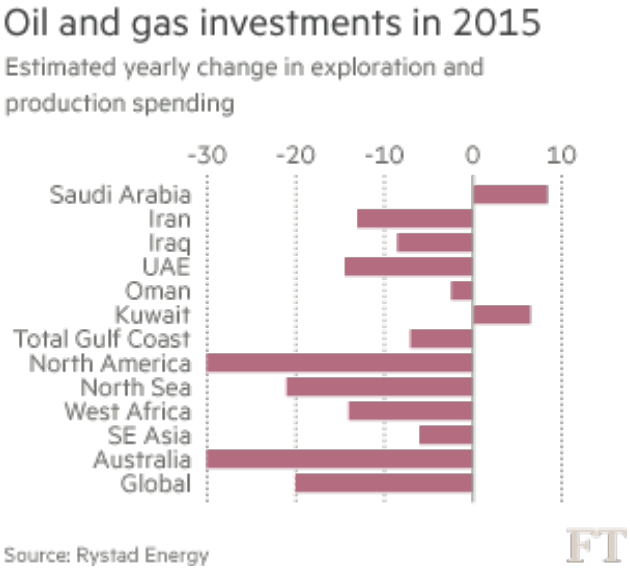
Saudi Arabia

- Saudi Arabia is the largest and most important member of OPEC, with over 10 mmbpd of crude production (about a third of the OPEC total); about 25% of production is exported. Importantly, Saudi Arabia also controls the majority of OPEC spare capacity (see previous chart).
- 6 mmbpd of Saudi's production comes from a single field, Ghawar, which is the largest oil field in the world.



Source: Bloomberg

- Saudi Arabia is currently estimated to have about 2 mmbpd of spare capacity, which is not high historically (see below). We understand from industry experts that despite the 12 mmbpd headline capacity number, 11 mmbpd is very close to a functional ceiling and even current production levels of around 10.5 mmbpd could be very strained in terms of Saudi Arabia's ability to produce without damaging their fields. In the past, Saudi Arabia has declared a policy of having at least 1.5-2 mmbpd of spare capacity on hand in case of potential crises that reduce oil supplies.



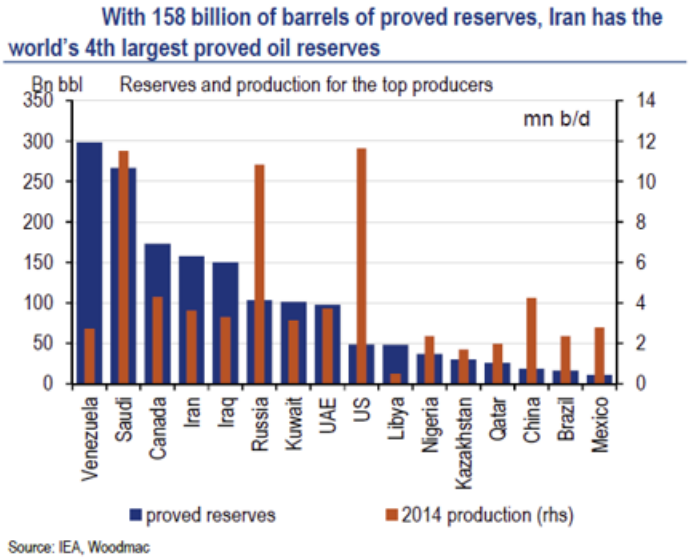
- The massive increase in Saudi Arabia's rig count in 2013, which was not accompanied by a corresponding increase in production, led to speculation that it was becoming increasingly difficult to maintain stable output from existing wells. In 2012, Saudi launched a $35 bn 5-year exploration and production investment plan, but this was explicitly meant merely to sustain current capacity at 12.5 mmbpd.
- In the mid-2000s, Saudi Aramco considered a 15 mmbpd target to meet global demand, but these plans were later shelved and the government declared that it considered 12.5 mmbpd capacity sufficient through 2020. The most recent major project was the 900 kbpd offshore heavy crude field Manifa, but this project served to offset declines elsewhere as opposed to increasing total capacity. Manifa cost $17 bn and the country had to wait six years from sanction to first oil.
- In the medium-term, Saudi capacity has the potential to move even higher with the addition of the 250 kbpd Shaybah expansion by April 2016, as well as new technology implementation which could boost production by over 100 kbpd by reactivating the Dammam field.
- Saudi Aramco highlights in its 2014 Annual Review that its exploration program discovered eight new fields in 2014, the most in its history, and these discoveries represent progress toward the long-term goal of growing the resource base. Saudi's reserve base has been flat at 260 bn barrels for the past five years.

Iran

- Iran used to be the fourth-largest oil producer in the world behind Saudi Arabia, Russia and the US. Production fell significantly in 2012 due to the impact of US-led sanctions, which shut out the participation of Independent Oil Companies (IOCs). The primary IOCs were Eni and Statoil, and Iran limited exports to 1 mmbpd. (In reality, exports have been as high as 1.2 mmbpd; top importers include China, South Korea, Japan and India.)
- With the increasing likelihood of Iran sanctions lifted this summer, we expect 500-700 kbpd to return to the market at some point between year-end 2015 and the first half of 2016. While Iran claims they can add as much as 1 mmbpd within a few months, experts generally agree that given the lack of investment over the past few years, a ramp up will be challenging and time-consuming. Considering pre-sanctions production of 3.6 mmbpd in 2011 and a natural decline in capacity that would come with lowered investments, many believe that Iran's true capacity today is less than the 3.3-3.5 mmbpd implied by the 500-700 kbpd estimate. Others expect that beyond the initial 700 kbpd increase, a further 300 kpd increase could be gradually reached by 2020 with some further investment by IOCs.

- There could be near-term upside risk to the 500-700 kbpd estimate, depending on how much of the Iranian oil in storage (rumored to be 30 mmbpd floating, 20 mmbpd onshore) comes to market. While storage wouldn't be emptied entirely, a worst-case scenario of 50 mmbpd of oil in storage released over six months would represent nearly 280 kbpd of incremental supply over that six-month period.

- In the longer-term, Iran may be capable of ramping production back up to close to 4 mmbpd by the end of the decade with incremental investment from IOCs. However, there would be a long lead time for new investments; it typically takes ten or more years from the start of a licensing round to first production.



Iraq

- Iraq is the second-largest OPEC producer and has matched Saudi Arabia's growth of 700 kbpd since the November OPEC meeting. For over a decade, Iraq has not been subject to a formal OPEC quota; this is not expected to change before 2017.
- Of Iraq's 4 mmbpd production, 3 mmbpd comes from the giant southern oil fields (key asset Rumaila field), 500 kbpd is from the north (Kirkuk) and 500 kbpd is from the autonomous region of Kurdistan. Kurdistan production capacity has the potential to increase by another 500 kbpd over the next decade, though conflict with Iraq will limit near-term export capacity.
- Iraq is expected to be a steady source of production growth within OPEC, adding 300-400 kbpd per year.

Libya

- Libya oil production was between 1.5-1.7 mmbpd for the 20-year period leading up to the 2011 civil war. In 2011, production slipped to nearly zero after the abandonment of production facilities and exodus of foreign workers.
- Despite recovery to 1.6 mmbpd in 2012, production has ranged between 200-800 kbpd for the past year and a half due to continued security issues, as the long-running conflict between the country's two rival governments has forced a halt to operations at strategic fields and terminals.
- Libyan production is expected to ramp up by 80-200 kbpd following the lifting of force majeure at the Ras Lanuf terminal in July. Longer-term, if/when the civil conflict is resolved, Libya will be a source of upside production risk as it returns to the historical 1.2 mmbpd level.

Other OPEC Members

- Angola (1.6 mmbpd) is set to grow by 50-75 kbpd per annum in 2018-2020 due to large startups like Block 32 Kaombo, but will decline modestly in 2015-2017 as startups are insufficient to offset the steep decline (production is 100% offshore, 75% deepwater or ultra-deepwater).
- Venezuela (2.4 mmbpd) and Nigeria (1.8 mmbpd) are member nations that constitute a significant portion of supply, yet represent potentially politically unstable regions that could suffer outages.

Supply: United States

Summary

As of the second quarter of 2015, the United States produced 9.7 mmbpd of crude oil (as reported by the IEA) and another 3.3 mmbpd of natural gas liquids (NGLs) for a total of 13.0 mmbpd (as reported by the IEA). As shown in the table below, approximately 5 mmbpd is from shale (tight/unconventional), of which over 90% is from the Big 3 shale areas: the Bakken, Eagle Ford and Permian.

U.S. Crude Oil Production (kb/d)

	2007	2008	2009	2010	2011	2012	2013	2014	1Q15	2Q15
Bakken	138	182	229	321	432	686	891	1,115	1,227	1,237
Eagle Ford	54	55	52	85	265	627	1,043	1,445	1,682	1,676
Permian: Vertical	849	850	842	870	925	992	1,024	1,068	1,039	999
Permian: Horizontal	0	22	37	64	116	199	325	571	992	949
Permian	849	875	880	923	1,018	1,191	1,350	1,640	1,968	2,031
Total Key Basin Production	**1,042**	**1,112**	**1,161**	**1,329**	**1,715**	**2,504**	**3,283**	**4,200**	**4,877**	**4,944**
Niobrara	125	133	133	144	165	201	265	377	458	447
Oklahoma	175	184	183	189	209	254	311	340	353	351
Other Unconventional Production	**300**	**317**	**316**	**333**	**375**	**455**	**576**	**717**	**811**	**798**
Alaska	**722**	**683**	**646**	**600**	**562**	**526**	**515**	**496**	**503**	**492**
California	**599**	**586**	**567**	**551**	**532**	**539**	**545**	**560**	**567**	**567**
Other U.S. Onshore	**1,065**	**1,080**	**1,037**	**1,057**	**1,088**	**1,157**	**1,235**	**1,295**	**1,243**	**1,276**
Offshore U.S.	**1,350**	**1,222**	**1,622**	**1,613**	**1,371**	**1,315**	**1,306**	**1,447**	**1,476**	**1,503**
Total U.S.	**5,077**	**4,999**	**5,349**	**5,483**	**5,643**	**6,496**	**7,460**	**8,714**	**9,476**	**9,579**
o/w: shale (tight/unconventional)	*492*	*579*	*635*	*791*	*1,165*	*1,967*	*2,835*	*3,849*	*4,649*	*4,743*
Y/Y Change		***(78)***	***350***	***133***	***161***	***853***	***964***	***1,254***	***1,335***	***962***

Source: Energy Information Administration

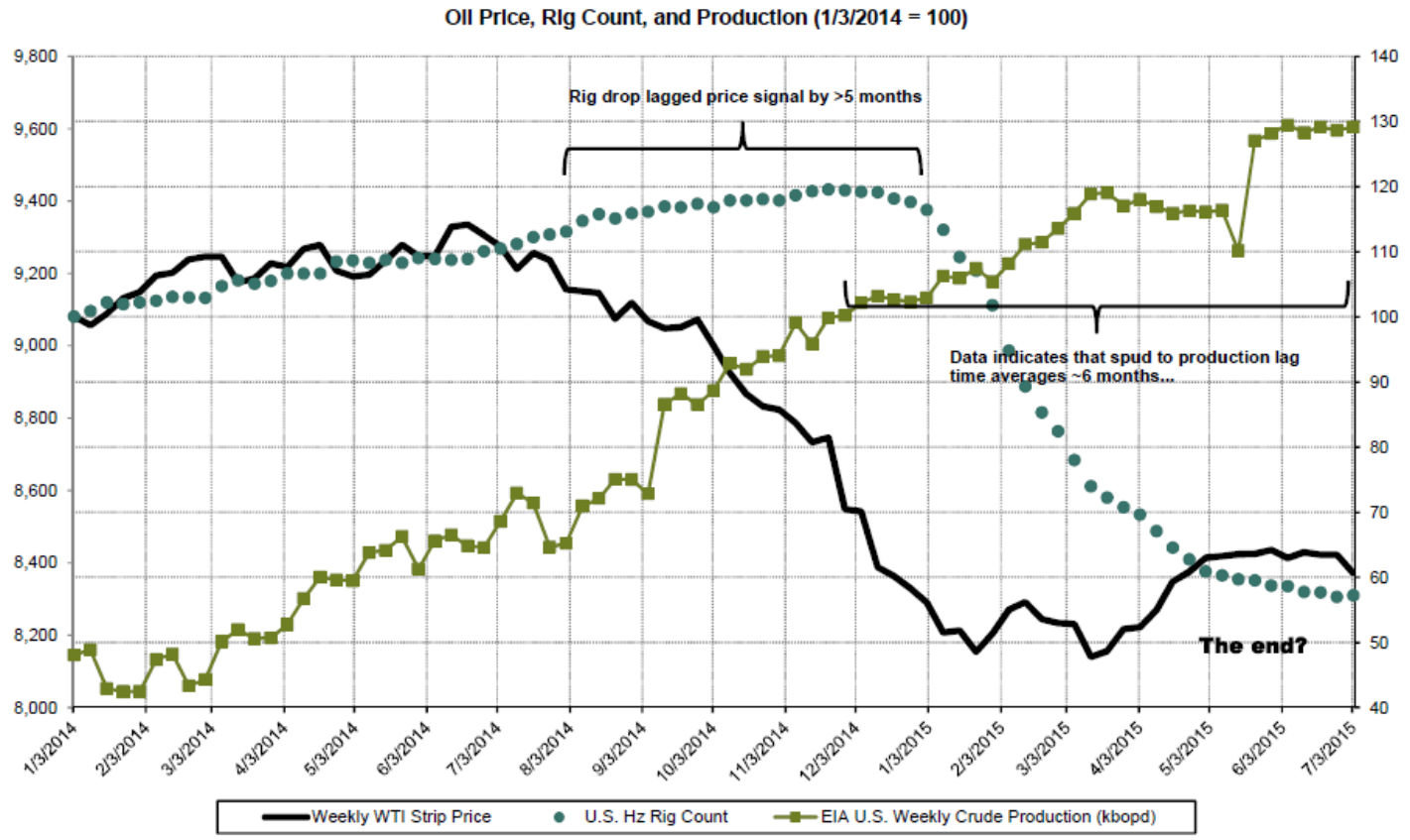
2015 YTD

In response to the drop in oil prices, the US rig count plummeted from over 1,900 in the fourth quarter of 2014 to under 900 as of July 2015. Of this amount, 650 are oil rigs; we further estimate that about 440 of these are horizontal rigs targeting shale oil production (the Baker Hughes data below classifies rigs as horizontal or oil separately, but does not specifically classify horizontal rigs targeting oil).

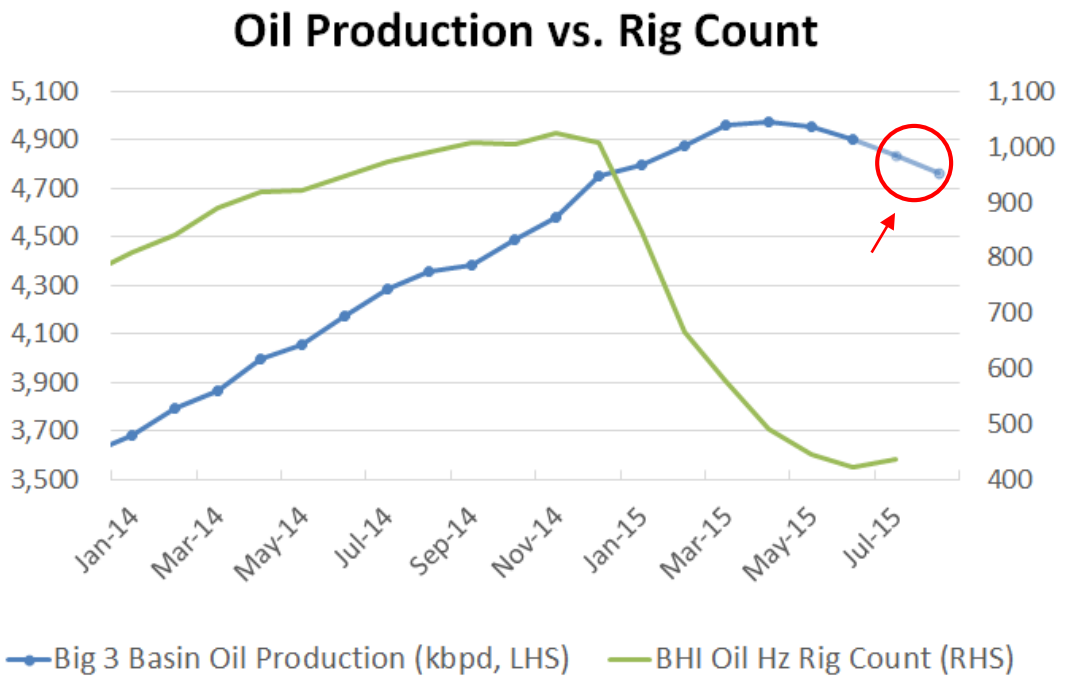
Using alternate data compiling the horizontal rig count for the four major shale oil basins, we see a similar decline of approximately 50% from the fourth quarter of 2014 to the second quarter of 2015, with every basin participating in the dramatic reduction.

However, despite the significant decline in rig count, shale oil production has yet to decline, as shown below.

The supply response to price can take ~12 months



Source: EIA; Bloomberg; HPDI; Baker Hughes; Bernstein analysis and estimates. "Spud" is the start of drilling on a new well.



Source: Energy Information Administration, Baker Hughes

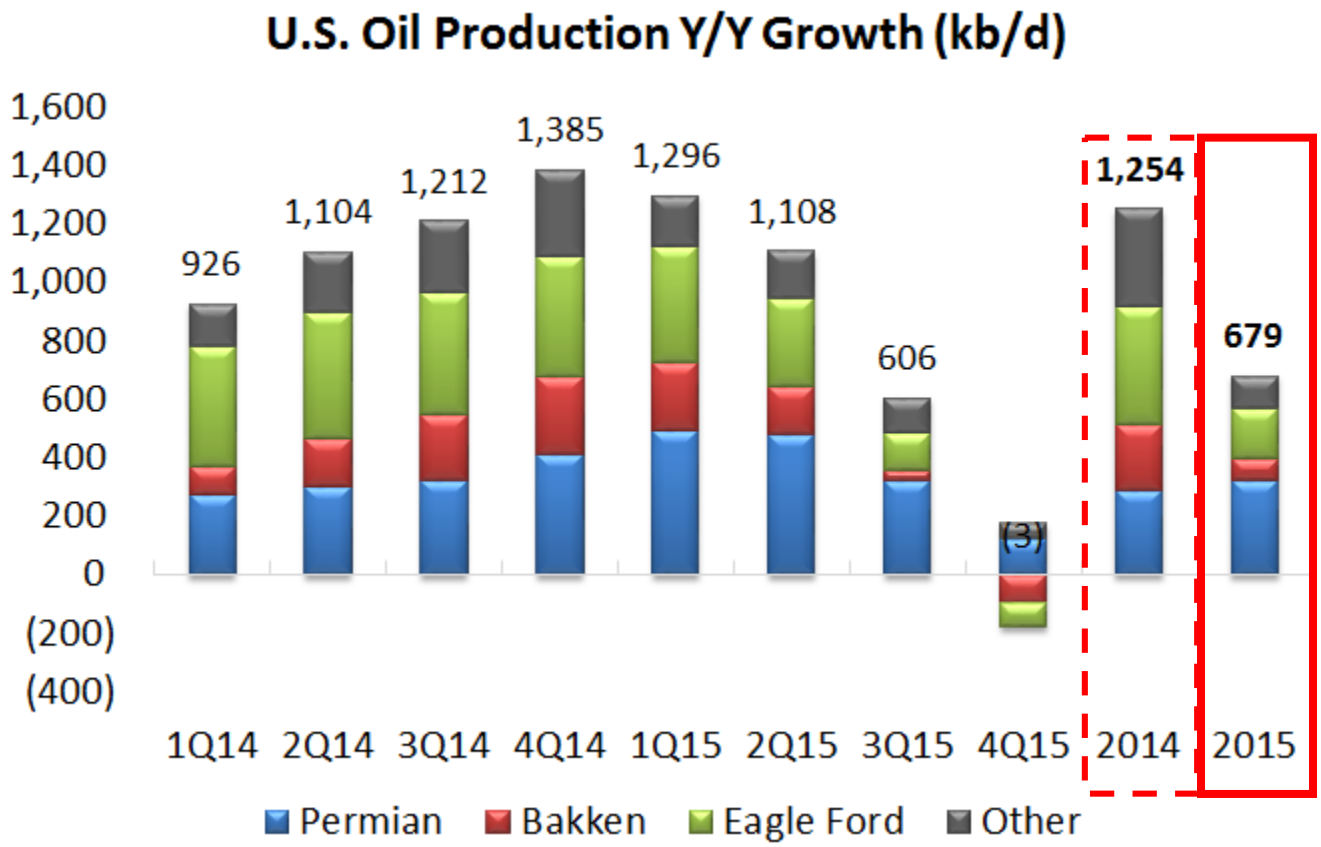
We believe production has been slow to roll over for two reasons: 1) the lag time between drilling and completion (about six months), and 2) increased productivity per well this year due to "high-grading," or shifting more drilling to the "core" of areas.

Lag time

The lag time between drilling a well and the well actually being placed on production is generally about six months, depending on the extent of pad drilling and availability of completion services. The lag time this year has extended to the wider end of that range, as operators have purposefully stretched out their inventory of drilled-and-uncompleted wells in order to defer production (and completion costs) for a time with expected higher oil prices.

The significant drop in the rig count for the major shale areas occurred in the first quarter of 2015; therefore, with a two-quarter lag, we expect the most significant impact on production to be in the third quarter of 2015.

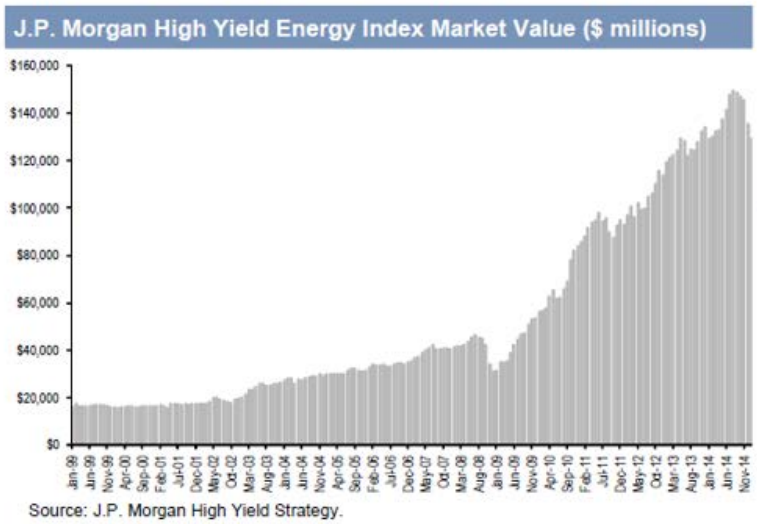
For 2015, we expect the first half of 2015 to roll off of the US rig count to result in a contraction in year-on-year growth to around 600 kbpd in third quarter of 2015 and flat in fourth quarter of 2015, for an average full-year 2015 growth of about 700 kbpd.



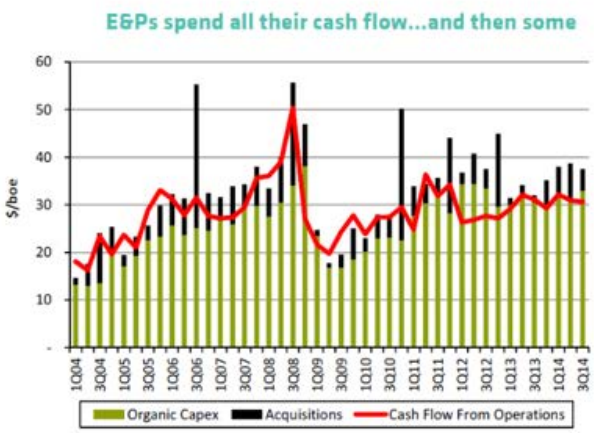
Source: Energy Information Administration

Operator Behavior

The US shale boom was arguably one made possible not only by high oil prices, but also accommodative bond markets.

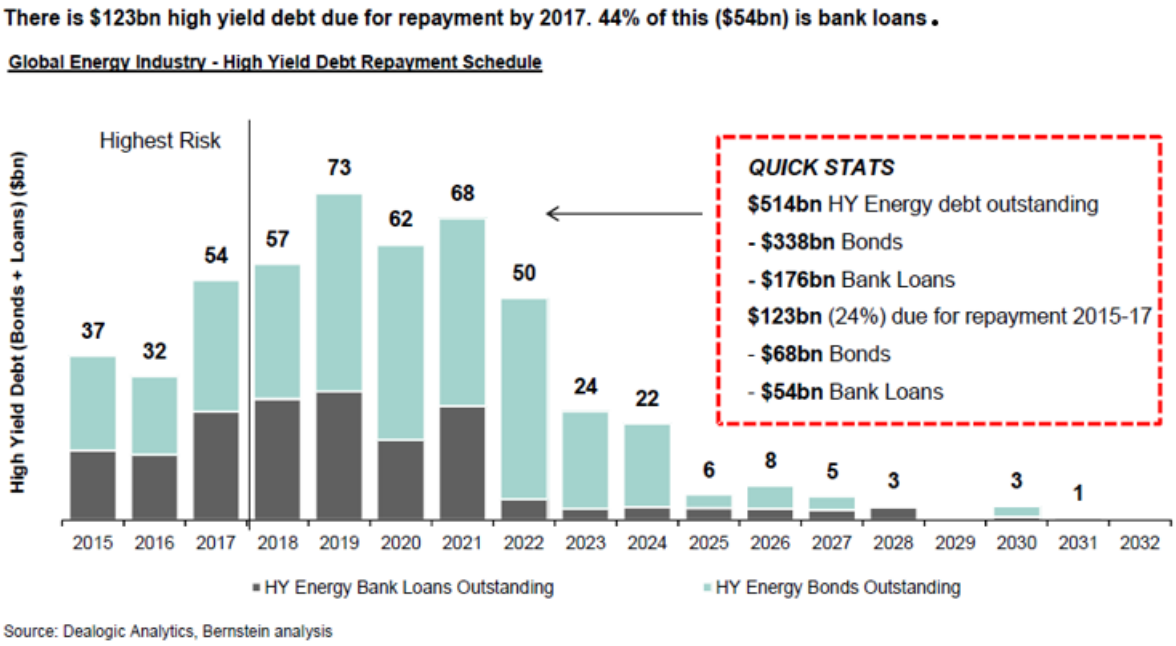


Source: J.P. Morgan High Yield Strategy.



Source: Corporate reports and Bernstein analysis.

About a quarter of global high yield energy debt needs to be refinanced in the next three years – this should add to management's urgency to maintain balance sheet strength.



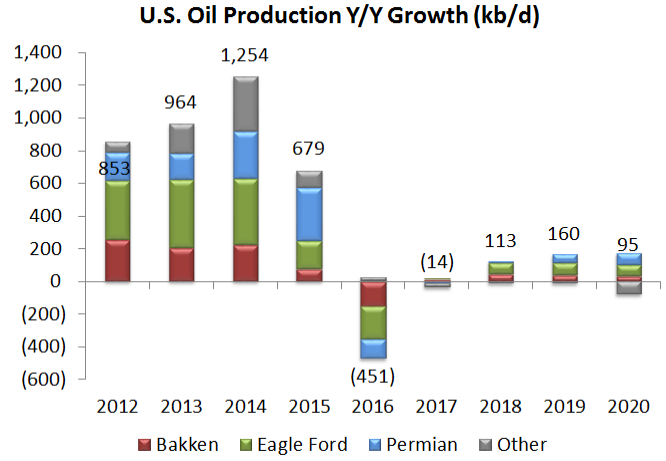
Source: Dealogic Analytics, Bernstein analysis

Over the past year, the equity markets have punished operators with higher than average debt leverage.

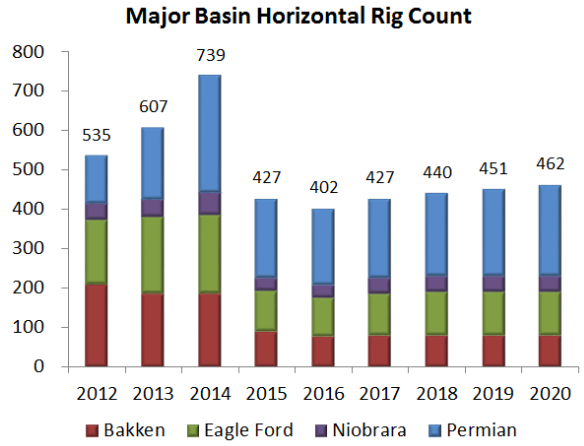
Current Forwards

At current forwards (WTI $50 in 2016, $55 in 2017), we estimate that US production will decline by 450 kbpd in 2016 and will be about flat in 2017.

- The key assumption is that the **rig count has to decline further to hold capital expenditures within cash flow**, as operators in this environment have become increasingly focused on spending within their means and holding financial leverage flat. We estimate that leverage (net debt/EBITDA) would still tick up from about 2.5x in 2015 to 2.7x in 2017.
- We assume continued productivity gains beyond the high-grading related gains seen in 2015, though such gains moderate in the Permian and Niobrara basins where high-grading was most prevalent.
- We also assume that well costs decrease by 33% from 2014 levels; this represents an additional 12% decrease from the roughly 24% savings that we estimate have already been realized this year.



Reflects Causeway estimates for 2015 onward
Source: Causeway Research, Energy Information Administration



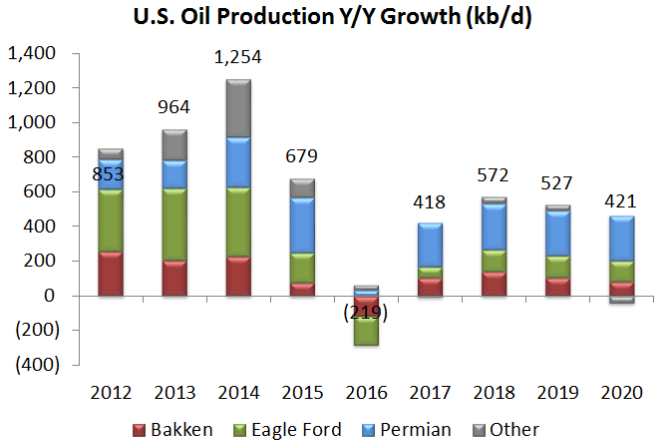
Reflects Causeway estimates for 2015 onward
Source: Causeway Research, Baker Hughes

Market Balance

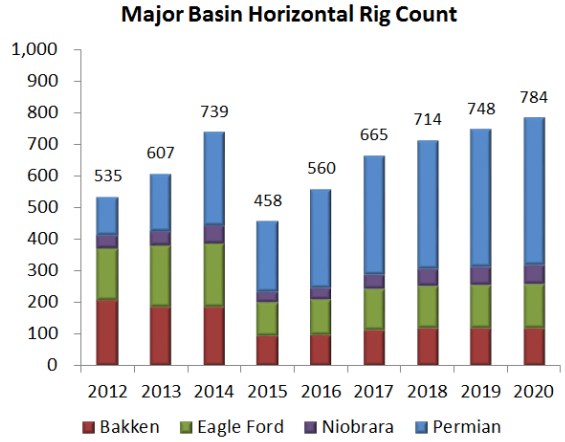
As mentioned previously, we project that the global supply/demand balance necessitates growth of about 500 kbpd from the United States by 2017 and beyond.

- To achieve this level of growth, the rig count has to increase by about 100 per year in 2016 and 2017.
- If WTI were to remain at current forwards (WTI $53 in 2016, $56 in 2017) while production still ramped up to this level, cash flow overspend would be over 135% (vs. 2014 at 125%) and leverage would increase from 2.5x to 2.7x.

- To fund this level of growth, WTI needs to rise to at least $65 to limit cash flow overspend to below 120% over the 2015-2017 period.
- At flat WTI of $45, overspend would balloon to nearly 150% by 2017 and leverage would increase to 3.4x, even after assuming additional well cost savings as in the scenario above.



Reflects Causeway estimates for 2015 onward
Source: Causeway Research, Energy Information Administration



Reflects Causeway estimates for 2015 onward
Source: Causeway Research, Baker Hughes

Supply: Non-US, Non-OPEC

The "Non-US, Non-OPEC" category comprises 45 mmbpd of crude and NGL production from 25 distinct IEA country classifications.

Growth for this group has been stagnant for the past five years, as growth from Canada and Brazil has been offset by declines from the North Sea, Mexico and Other.

mmbpd

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	CAGR
Russia	9.6	9.8	10.1	10.0	10.2	10.5	10.6	10.7	10.8	10.9	1.4%
Norway/UK	4.8	4.4	4.2	4.0	3.9	3.5	3.2	2.9	2.7	2.8	(6.0%)
Canada	3.1	3.2	3.3	3.3	3.2	3.4	3.5	3.8	4.0	4.3	3.8%
Brazil	2.0	2.1	2.2	2.4	2.0	2.1	2.2	2.2	2.1	2.4	1.9%
Mexico	3.8	3.7	3.5	3.2	3.0	3.0	2.9	2.9	2.9	2.8	(3.2%)
China	3.6	3.7	3.7	3.8	3.9	4.1	4.1	4.2	4.2	4.2	1.7%
Other	16.2	16.7	15.3	16.6	18.1	18.3	18.2	17.6	17.7	17.8	1.1%
Non-OPEC, Non-US	43.1	43.6	42.3	43.2	44.3	44.8	44.7	44.2	44.4	45.1	0.5%

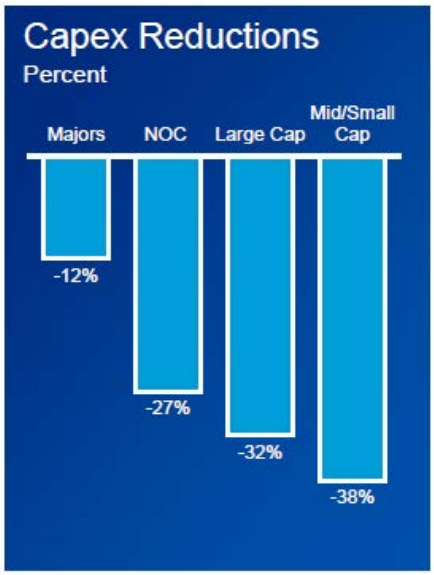
Source: IEA Oil Market Report, 7/10/15

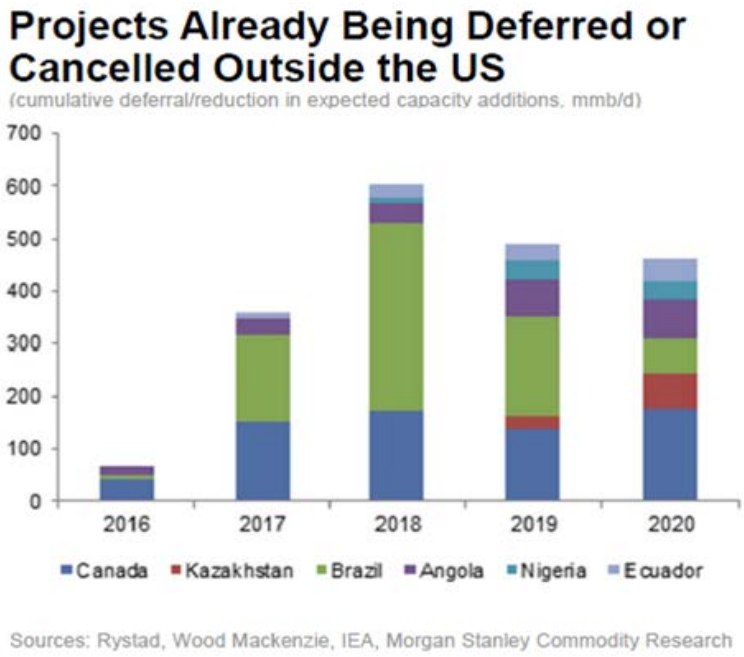
As of July, the IEA projects Non-US, Non-OPEC production growth of 100 kbpd in 2015 and -300 kbpd in 2016.

We see five regions growing production in 2015-2016: Brazil (100-150 kbpd p.a.), Canada (100-200 kbpd), Russia (0-100 kbpd), Malaysia (60-80 kbpd), and Norway (0-50 kbpd). In our forecasts (in-line with current IEA forecasts), a number of growth projects deliver front-loaded growth in 2015 for net growth of about 100 kbpd, but a gradual increase of the decline rate along with a decrease of the growth pipeline flips net growth to negative in 2016 and 2017.

As a reference, IEA projections for non-OPEC supply has often proved optimistic (and this includes the United States, which would have surprised to the upside in recent years).

Major producers have already cut capex plans significantly, with further cuts likely to follow in the second half of 2015 if oil prices stay below $60. We expect that capex cuts will have the biggest impact on 2017 production. The decrease in projected 2017 supply is consistent with the large number of project deferrals that have already been announced impacting growth projections in 2017 and beyond.





Source: Chevron Corporation

Supply/Demand and Inventory Analysis

Marginal Cost

US Shale

In the *Supply: United States* section we estimated that WTI had to be at least $65 in order to fund sufficient rig count increases to get back to approximately 500 kbpd of US shale-driven growth in 2017-2020. This was based on well cost savings of about 24% vs. 2014 levels. As shown below, 24% is higher than the savings that most operators are expecting for this year, so we believe we are being conservative from a marginal cost perspective (i.e. the actual marginal cost could be higher than $60).

As an example, Continental Resources (CLR) disclosed that it would need to spend $2.4 bn to keep production flat; however, implied annualized cash flow (EBITDAX as a proxy) at $49 oil fell $600 mm short. Extrapolating cash flow per barrel of $33 on 144 kbpd of production, CLR would require oil prices of $60 to cover its maintenance capex and maintain flat production.

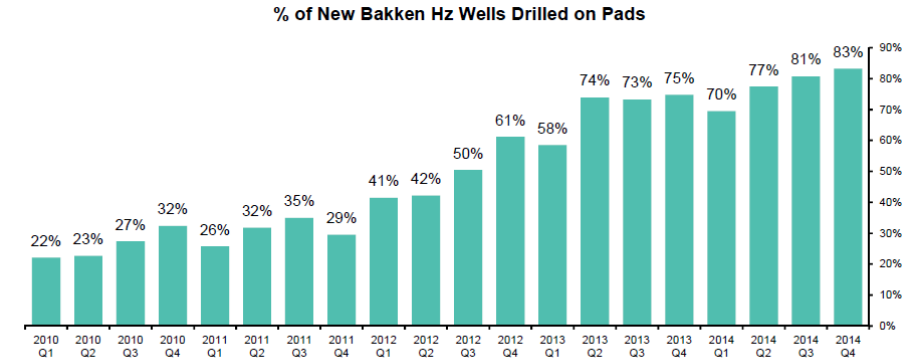
Case Study: Continental Resources Marginal Cost

1Q15 production (kbpd)	144	
1Q15 average WTI price	**$48.6**	
Annualized production	52,560	
1Q15 EBITDAX	439	
Annualized EBITDAX	1,756	
EBITDAX/bbl	**$33.4**	
Maintenance capex	(2,370)	*Company guidance of capex req to maintain flat production*
Cash shortfall	(614)	
Shortfall/bbl	($11.7)	
Breakeven price	**$60**	*Implied price required to maintain production*

Source: RHB

"Risk" of further efficiencies

In terms of further efficiencies, much of the benefit to be had in terms of cost savings and reduced drilling time per well associated with pad drilling has been realized, as the vast majority of horizontal wells are now on pads.



Source: HPDI, Bernstein estimates

"Risk" of further well cost savings

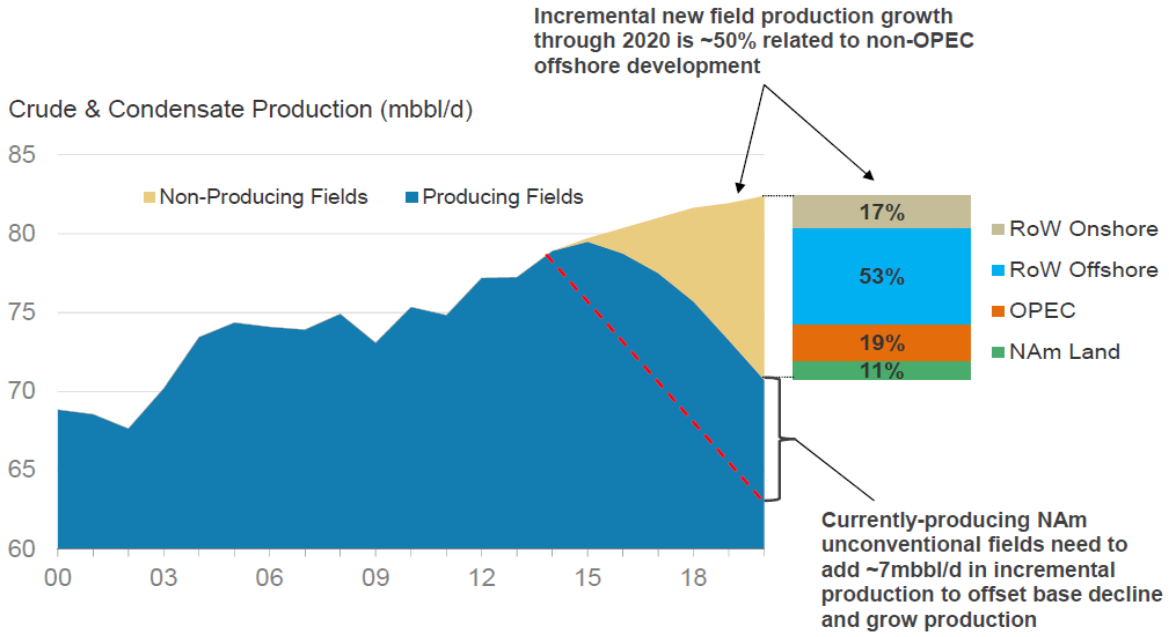
In terms of further cost savings should oil prices remain at depressed levels, we believe there is limited room for further cost savings.

- 60% of well costs are related to completion costs (fracking), and we understand from operators and service providers that those costs are already at or below cash breakeven levels for those service providers (the market is oversupplied so service companies are taking work just to increase utilization).
- While half of completion costs are labor, even if labor were to fall by 20%, this would only decrease completion costs by 10%, and therefore well costs by 6%.
- Regarding other potential cost reductions, day rates are about still about $5,000 per day above cash costs of $13,000; but even if these were driven down 28% to cash costs, they only represent 15% of the total so this would only reduce well costs by 4%.
- The incremental "worst case" completion labor cost reductions corresponds to our "bear" case scenario under which well costs decrease by 33% vs. 2014 levels. Even with these incremental savings, we projected that the rig count would have to be cut further from current levels in order to sustain capex within cash flow at current forward prices.

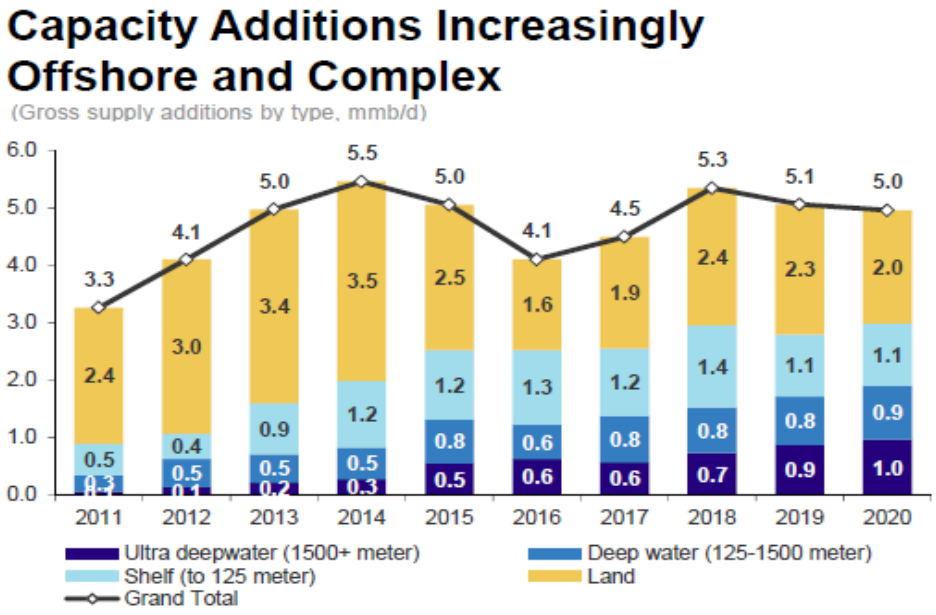
Non-OPEC, Non-US

In our central scenario of 1 mmbpd demand, 500 kbpd is met by US shale and the other 500 kbpd is met by OPEC, with Non-OPEC, Non-US held flat. However, if the oil price is insufficient to incentivize Non-OPEC, Non-US production, that 45 mmbpd category will decline (estimated decline rate of about 5% or 200 kbpd). Therefore, the marginal cost of this Non-OPEC, Non-US category becomes important.

Incremental production through 2020 requires offshore development

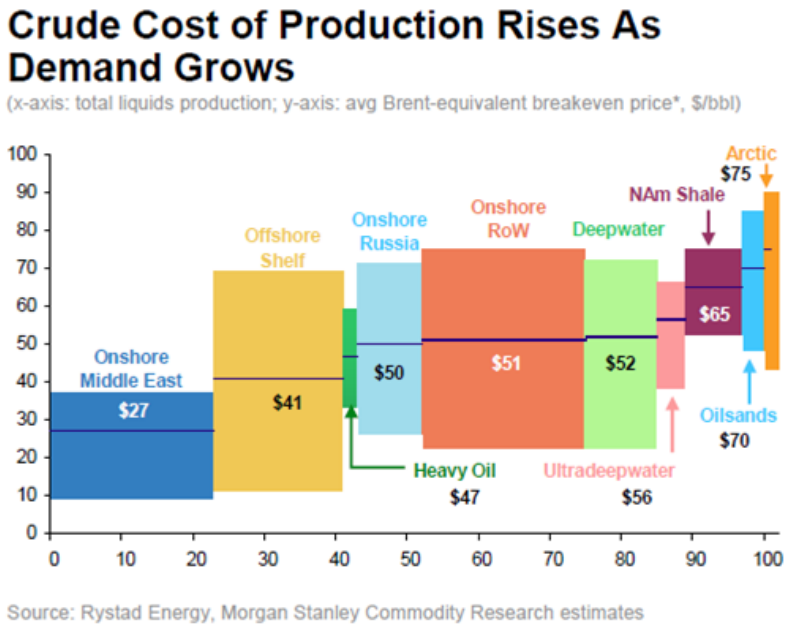


Source: Rystad Energy, Morgan Stanley Research estimates



Source: Rystad Energy estimates, Wood Mackenzie, IEA, HDPI, JODI, Morgan Stanley Commodity

As shown below, some estimates place deepwater costs at or below that of shale.



We believe that cost decreases of 15-25%, in-line with what was achieved during the last downturn, should be achievable for the industry. This could make deepwater projects that were previously attractive economically at Brent prices of $90-95/bbl equally as attractive at Brent prices closer to $70-75/bbl.

For more information and appendix graphs on Russia, China, Mexico, North Sea, Saudi Arabia and OPEC, oil sands, technology's impact on finding costs, oil versus shale gas, oil vs. mining, China urbanization and crude oil inventories, please contact Causeway's Client Service department at clientservices@causewaycap.com

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