# Oil Market Outlook

## – The Fat Lady Has Started To Sing

- "Sad but true" for Norway
- A dream come true for the US

"Hey, I'm you life
I'm the one who took you there
Hey, I'm your life
And I no longer care"

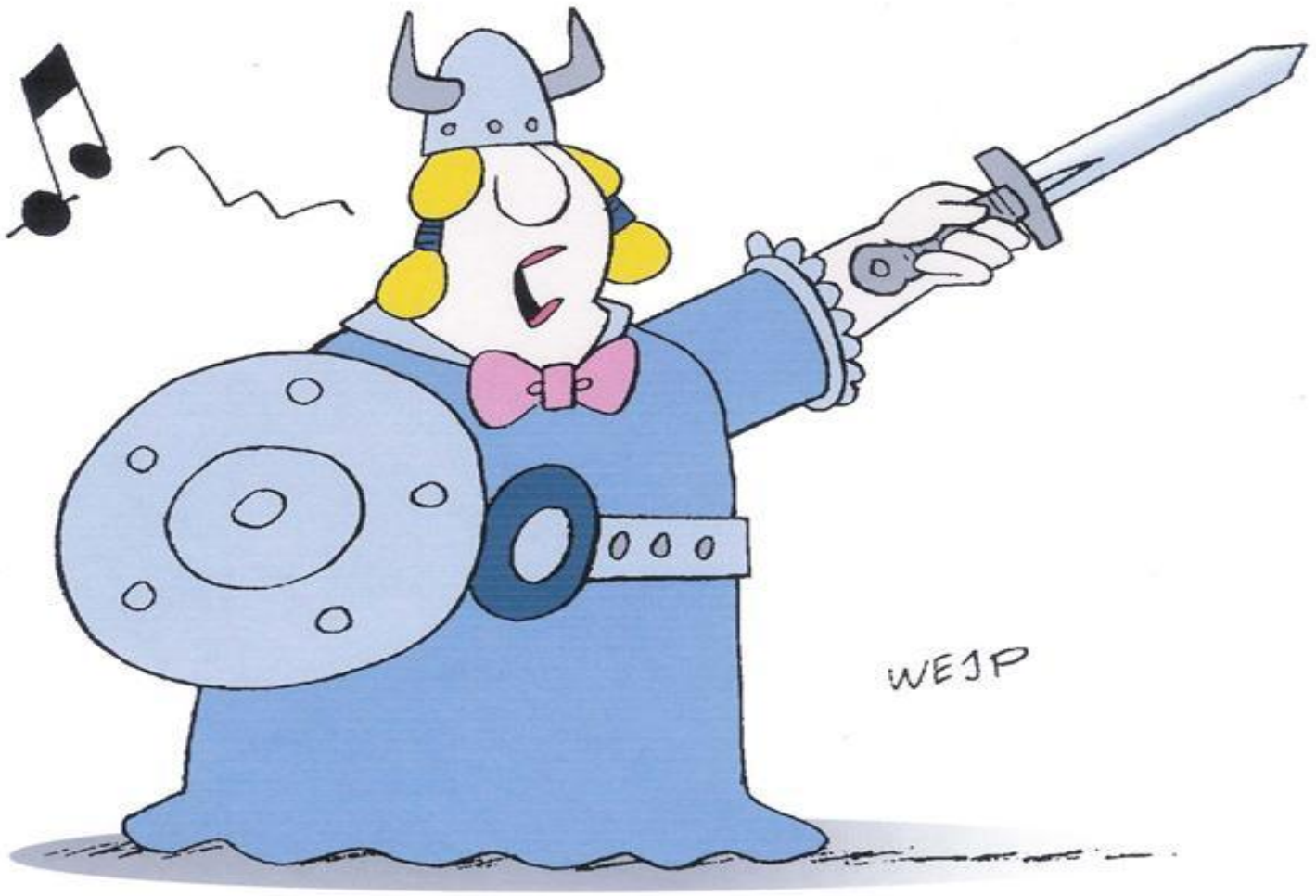
*Quote: Hetfield, Ulrich, Alan – "Sad but true"*

22 August 2012 - Torbjørn Kjus

# The Fat Lady Has Started To Sing – “Sad But True”

- “Hey, I’m your life – I’m the one who took you there - Hey, I’m your life and I no longer care”

*Metallica – “Sad but true”*

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# Content



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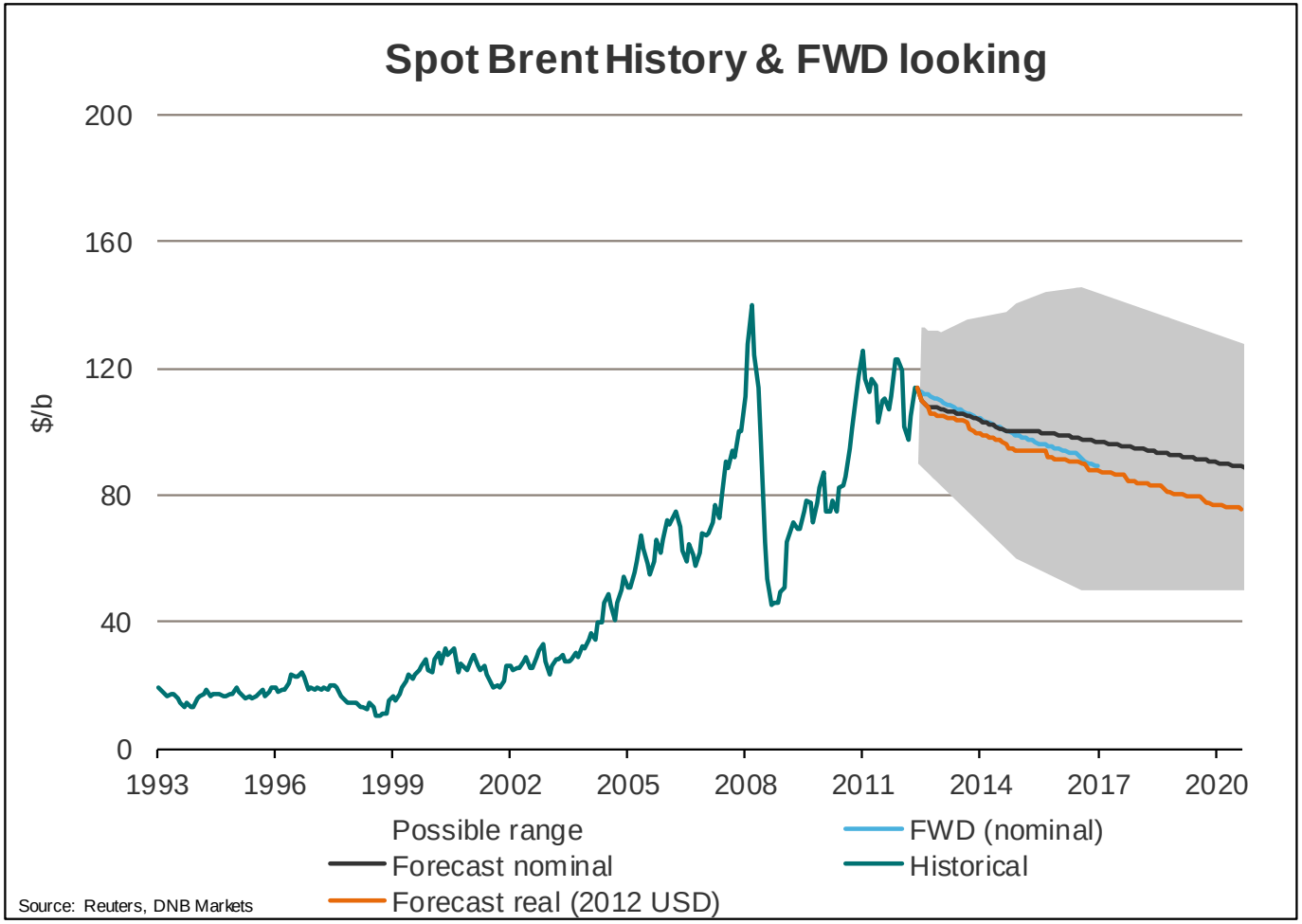
# Long Term Oil Price Forecast

(The forecast is for the average of the rolling 1st month ICE Brent future contract)

| | Historical Nominal $/b | Historical Real (2011) $/b |
|---|---|---|
| **2001** | 24.9 | 31.1 |
| **2002** | 25.1 | 31.3 |
| **2003** | 28.5 | 35.3 |
| **2004** | 38.1 | 46.6 |
| **2005** | 55.0 | 62.8 |
| **2006** | 66.2 | 72.7 |
| **2007** | 72.7 | 78.5 |
| **2008** | 98.7 | 101.6 |
| **2009** | 62.6 | 64.7 |
| **2010** | 80.4 | 82.0 |
| **2011** | 110.8 | 110.8 |
| | **Forecast Nominal $/b** | **Forecast Real (2012) $/b** |
| **Q2-12** | 109 | 109 |
| **Q3-12** | 110 | 110 |
| **Q4-12** | 109 | 109 |
| **2012** | 111 | 111 |
| **2013** | 107 | 105 |
| **2014** | 102 | 98 |
| **2015** | 100 | 94 |
| **2016** | 98 | 90 |
| **2017** | 96 | 87 |
| **2018** | 94 | 83 |
| **2019** | 92 | 80 |
| **2020** | 90 | 77 |




Source: Reuters, DNB Markets

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# 2013 Oil Price Scorecard

| 2013 Oil Price Scorecard | Comments | Oil Price | Weight |
|---|---|---|---|
| **Overall Outlook** | There will be large powerful forces working in different directions for the oil market in 2013. Geopolitics and increased liquidity poored into the system from central banks should pose positive elements for oil prices but fundamentally the market will not look strong. In most cases the average oil price falls from the prior year if the 'Call on OPEC' falls. Hence we believe oil prices will be lower in 2013 than in 2012, but still average well above 100 $/b, supported by the mentioned geopolitical and liquidity factors. | **Average price107 $/b** | |
| **Fundamentals** | | | |
| Global Fundamental Balance | We forecast 'Call on OPEC' will decrease by 0.8 million b/d on a combination of solid growth in non-OPEC supply (particularly from North-America) and weaker net oil demand growth. | **BEARISH** | **HIGH** |
| Crude vs Product Balance (Margins) | Global refinery margins will weaken as demand for light oil products will be lower than refinerie's upgrading capacity expansions. At the same time there is solid growth in light sweet crude output and NGLs. | BEARISH | MEDIUM |
| OECD Stock levels | OECD stock levels are above the 5-year range when measured in days of demand coverage. Unless OPEC cuts back output next year, OECD stocks will grow. | BEARISH | LOW |
| OPEC Spare Capacity | Since we believe there will be a need for OPEC to cut production next year and since we believe Saudi Arabia will defend oil prices around 100 $/b, the implication of lower output from OPEC is higher spare capacity. In addition the production capacity is expected to grow in Iraq, Libya, Iran (due to some leakage vs the embargo) and Angola. | BEARISH | MEDIUM |
| US Oil Statistics - Fundamentals | US oil demand is expected to fall 0.1 million b/d next year while liquids supply is expected to grow 0.7 million b/d on the back of the new shale liquids industry. | BEARISH | MEDIUM |
| Global Demand Growth | We believe global oil demand growth will be weak also in 2013. A high oil burden normally provides less "bang for the buck" with respect to the intensity factor vs economic growth. Instead of growing 0.5 percent for every percent growth in global GDP, we believe 2013 , just as 2012, will offer significantly lower oil demand growth per unit GDP-growth than the long-term average of 0.5. Chinese oil demand growth has been weak so far in 2012 and with expectations of weaker economic growth next year there is probably no reason to expect trend-line growth of Chinese oil demand in 2013 either. We think global oil demand will grow only 0.6% in 2013 and 0.9% in 2012. Chinese oil demand is expected to grow 233 kbd next year vs 245 kbd in 2012. European oil demand will continue to fall, next year by 0.4 million b/d, the same as in 2012. OECD Asia oil demand growth, which has been so strong in 2012 due to oil used in the power sector in Japan, is expected to fall toabout zero in 2013. That could prove to be optimistic as the 2012-numbers have been inflated by all the nuclear outages (and if many of these reactors return to service next year, oil demand in Japan will instead fall). Total OECD demand is expected to fall 0.5 million b/d next year while total non-OECD demand is expected to rise by 1 million b/d, providing net global oil demand growth of a weak 0.5 million b/d. We still forecast decent demand growth in Asia, Latin America and most of the Middle-East, but the expected weakness in OECD offsets much of the demand growth in non-OECD. | BEARISH | MEDIUM |
| OPEC Supply | We think OPEC will reduce it's production meaningfully in 2013, both since Saudi Arabia will cut it's output to balance the market but also since the Iranian conflict is not set to be resolved and hence Iranian capacity is not set to be fully restored in 2013. | BULLISH | LOW |
| Non-OPEC Supply | Non-OPEC production including biofuels is expected to increase by 1 million b/d in 2013. 70% of this growth is expected to come in North-America, due to the shale liquids revolution. OPEC NGLs production is expected to increase by 0.3 million b/d. This is normally added to the non-OPEC supply category since it is not part of OPEC's quota system. This means total non-OPEC production including OPEC NGLs is expected to increase by 1.3 million b/d. We also do not expect the unplanned supply outages caused by accidents, strikes, security issues, technical problems and weather to be as high in 2013 as we have seen in 2012. So far in 2012 the oil consultancy PIRA estimate unplanned non-OPEC outages to have averaged 1.0 million b/d, compared with 0.5 million b/d in 2011 and much lower in 2008-2010. The largest part of the unplanned outages in 2012 is due to reduced production in Sudan/South-Sudan, Syria and Yemen. | BEARISH | MEDIUM |
| **Political Risk** | | | |
| Iraq, Iran, Nigeria, Venezuela, US, Russia, Israel, MENA, etc | The largest risk is connected to Iran's nuclear program and the fact that EU has decided an oil embargo vs the country and US has imposed financial sanctions. Officials in Iran have threatened to close the strait of Hormuz where 35-40% of the worlds traded oil passes through. We do not think Iran in reality will close the strait. It is rational to threat to close it but irrational to in fact do it. Iran does not have the military muscles to match the US fifth fleet which is based in Bahrain. We also believe there is only a very small chance that Israel will attack Iran in 2012, even though many players will likely place some bets on that to happen. After the US elections in November there is however a larger chance for a physical attack since the US will need to be part of this to make any action successful. There is also constant risk for output disruptions in the whole of Middle-East/North-Africa as the arab spring is not at all over in our view. The ongoing unrest in Syria risks to spill over in a wider sunni-shia conflict that could threaten stability in the whole region.There is no doubt that geopolitical risk still justify a price premium in the oil market for 2013. | **BULLISH** | **HIGH** |
| **Other Factors** | | | |
| Financial Money Flow | The US has had it's quantitative easing (QE) nr 1 and nr 2. Both supported oil prices. Also the European LTRO-program launched last December was positive for oil prices. Generally any increased liquidity will probably spill over into stronger oil prices. The only solution to the European debt crisis could end up being that the ECB will have to help European countries inflate out of the debt problem. This could be serious trouble for the real economy and physical oil demand but could still support oil prices through financial demand for oil (both as investments and hedge vs inflation). | BULLISH | MEDIUM |

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# Highlights

- Revising down our oil price deck and stretching the forecast up to year 2020

- For several years we have claimed that oil prices would have to trend higher due to weak growth in supply outside of OPEC and hence a need to keep demand growth in check. So far we have stretched our forecast to 2015. **We are now introducing for the first time an oil price forecast that runs until 2020.**

- Our conclusion is now opposite from when we started publishing our 2015 forecast four years ago. **From 2013 we believe oil prices will start to trend lower and continue to trend lower as we move towards 2020.** The new marginal barrels are set to become shale crude in the US and after 2020 this could even become a global industry. We think the cost to produce shale liquids will rather trend lower than higher during the current decade, hence oil prices should also rather trend lower than higher. The very interesting thing with the new shale liquids industry is that it can be seen as a traditional manufacturing business which is very different from most of the current growth regions in non-OPEC which mainly offshore oil production. Hence decline rates and lead time from investment to cash flow becomes less important than before. **By 2020, the US net imports of crude oil is set to fall by 4-5 million b/d on a combination of lower oil demand and growth in shale liquids supply**. These pushed away US imports barrels means cheaper available barrels for Europe and Asia. Hence the oil market impact of the US shale revolution becomes global.

- **US demand for refined products is set to trend lower towards 2020 on a combination of efficiency gains in the car fleet and substitution in the transportation sector**, particularly the transportation of goods which currently mainly runs on diesel. This means that even if we believe US economic growth will surprise to the upside during the coming decade, demand for refined petroleum products will decrease. We believe that the US availability to the cheapest energy in the world will create tens of thousands of jobs in the US in all industrial sectors that use energy as feedstock. These are sectors like petrochemicals, fertiliser, aluminium, cement, etc, etc. Hence we believe US economic growth will surprise to the upside later in this decade, but unlike earlier periods this will not provide increased demand for refined oil products. Natural gas demand is however set to increase significantly during the coming decade.

- **Chinese oil demand growth which the last five years has represented 0.5 million b/d of average global oil demand of 0.8 million b/d is set to decrease it's pace in the coming ten years on the back of lower trend-line economic growth**. We do not believe Chinese GDP can continue to grow at above 10% as it has done the latest 10 years. The coming ten years will probably rather see growth rates in the 7-8% range.

- **We are revising down our 2012 forecast to 111 $/b from previous 115 $/b. We revise down our 2013, 2014 and 2015 forecast to 107 $/b, 102 $/b and 100 $/b from our prior forecast of 120 $/b for these three years. From 2014 we forecast oil prices to trend lower by 2 $/b every year until 2020 in nominal terms. This means 90 $/b in 2020 in nominal terms which translates to 77 $/b in real terms using a 2% inflation rate. The 77 $/b in real terms in 2020 roughly consist of: cost of shale liquids (55 $/b) + a margin to secure continued investment (10 $/b) + a geopolitical risk premium (12 $/b).**

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# The Stone Age Did Not End Due To Lack Of Stones

… and the oil age will not end due to lack of oil

- In the start of 2008 we started forecasting oil prices ahead to 2015. We claimed that due to struggling oil production growth outside of OPEC the oil price would have to trend higher in order to keep demand growth in check enabling the market to balance supply and demand. We held that view until April this year when we published our report “Enough is Enough” where we claimed that it would not be necessary for the oil price to continue to trend upwards anymore to balance the market. Enough signs have emerged on both the supply and the demand side since 2011 to make us reach that conclusion.

- We have always been a believer in peak oil, but not the traditional peak oil theory based on the Hubbert bell curve of production. Instead our view of peak oil is that oil demand will peak before lack of supplies. Just like the Stone Age did not end due to a lack of stones, the oil age is not going to end due to a lack of oil. We think the limited production growth from non-OPEC the latest decade has been more related to problems above ground rather than below ground. Political unrest, political decisions and low investment rates in the late 1990s, in combination with depletion of mature producing areas like the North Sea and Mexico set up the stage for the weak non-OPEC output growth the latest decade.

- Until April this year we had forecasted gradually increasing oil prices in our price deck, but had only stretched the timing up until 2015. As a signal that the oil price would have to trend higher to curb demand we had put in a round number in a round year; 150 $/b in 2015. In our presentations we have emphasized that this was on purpose a round number in a round year, because it would be impossible to say how high oil prices would have to move in order to initiate the required effect on both supply and demand. We were uncertain if 150 $/b would be high enough although at such a price level the global oil pain would reach the level it did in 1980, which in itself unleashed a global economic recession. Maybe 130 $/b would be high enough, or maybe the oil price would have had to move all the way to 180 $/b to provide the changes we were looking for? It would also never just be the level of oil prices in themselves but in a combination of how quickly prices were rising that would affect the potential level the oil price could reach. Our interpretation is however now that it was probably high enough for oil prices to climb to the 110-120 $/b price range to release the effects we have been looking for on both supply and demand.

- The best two graphs to illustrate what we are talking about would be the pictures showing oil production in Texas and seasonally adjusted oil demand in the OECD. Both of these graphs in our opinion perfectly illustrates that price changes will initiate changes in supply and demand. The large challenge in forecasting the oil price has been that the last ten years has offered the slowest cycle we have ever seen in the oil history with respect to supply responses. This has led many analysts to claim that “this time it is different”. For the first time in history we have seen oil price increases in nine out of the latest ten years.



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# Peak Oil (Demand) Has Already Happened In The OECD

- More than half of the reduced consumption of refined products in the OECD looks to be structural and not cyclical

- Oil demand in the OECD has fallen from 50 million b/d at the peak in 2005 to 45 million b/d currently. Much of the fall-off in OECD demand happened during the large recession in 2008-09. Hence it is quite reasonable that people often ask during our presentations how much of this 10% reduction in OECD oil demand that is caused by cyclical factors and how much of it is structural.

- The above question is not possible to answer with total precision, due to lack of data for oil product demand drilled down to the specific sectors where the oil is used. It is however possible to answer with adequate precision just by using the IEA database split into the main product categories. Motor gasoline and jet fuel demand is reduced by about 1.5 million b/d. Both of these are almost pure transport fuels and most of this reduced consumption is probably cyclical due to both high prices and a poor economy. Other gasoil and residual fuel oil demand is however down 3.3 million b/d and most of that is on the other hand probably structural. These latter two products are mainly used for stationary purposes like heating, industrial production and power generation. We have long been in a structural trend where refined oil products take a constantly smaller part of that kind of stationary energy demand. We are hence quite confident that more than half of the decline in refined oil product demand since 2005 has been structural rather than cyclical. This again makes us fairly confident when claiming that peak oil demand has already happened in the OECD.

- The ranks of the largest oil consuming countries in the world have not changed. Number one is still by far the US, which looks to have peaked at about 21 million b/d in 2005. Oil demand in the US did in fact touch 21 million b/d also just before the economic recession in the early 1980s but then fell sharply to about 15 million b/d during the economic downturn. The loss of oil demand was assisted by huge substitution effects when loads of demand for heating oil and residual fuel was permanently destroyed. The massive substitution is very visible in the long data series for US oil demand where one can note that the large seasonal swings in demand from winter to summer largely disappeared after the economic recession in the early 1980s. The lost US oil demand since 2005 is split in a loss of 0.8 million b/d for gasoline and jet (mainly cyclical), while residual fuel and heating oil is together down about 1.3 million b/d (mainly structural). Total demand for heating oil and residual fuel oil put together is still above 0.8 million b/d in the US so there are still some barrels left for natural gas to “steal” from oil in the US stationary sector.

- We are now however on the verge of the first meaningful substitution possibilities in the transportation sector as well. The number of oil barrels that can be replaced by particularly natural gas will be quite meaningful before 2020. The “low hanging fruits” in the US transportation sector when it comes to possibilities of reducing consumption of refined oil products are extremely visible. The Obama administration has hence targeted large fuel efficiency gains in the US car fleet by 2025.



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# US Fuel Efficiency Standards Set To Meaningfully Improve

- "Low hanging fruit" in the US transportation sector

- The US was the first country to establish fuel economy standards for passenger vehicles after the 1970's oil crisis. These standards have however remained practically unchanged from the early 1980s and until the late 2000s. In other parts of the world the fuel efficiency standards have improved massively in the same time frame. In Europe the average fuel efficiency for personal transportation vehicles is for example twice the level as in the US. The US is at about 22 MPG while Europe is at about 45 MPG in efficiency. This means that the US has large possibilities to improve the efficiency in the car fleet during the current decade.

- American politicians are aware of this opportunity and the Obama administration last summer launched ambitious new efficiency standards for the US transportation sector. This is important because as we have already highlighted the efficiency standards for the US car fleet has been practically unchanged for the last couple of decades. The Obama administration has announced the merge of Federal efficiency standards with the California standards. The Environmental Protection Agency (EPA) and the National Highway Traffic and Safety Administration (NHTSA) has for the first time developed harmonized standards for future model years. This national programme will be harmonized with applicable state standards to ensure that automakers will be able to build a light-duty fleet that satisfies all requirements.

- The main problem with the old US driving standards was that Sports Utility Vehicles (SUVs) were not subject to the same requirements in driving standards as vehicles classified as passenger cars. And when about half of the new automobile sales in the US have consisted of so called Light Trucks (mainly SUVs) the car fleet efficiency has of course not been improved at all and has further and further lagged European standards. In fact about 111 million of the 252 million total US automobile fleet consist of light trucks according to the oil consultancy PIRA. The new Corporate Average Fuel Efficiency (CAFE) standards will however going forward now include much stronger requirements also for light-duty vehicles. This light-duty vehicle class will include SUVs and smaller pick up trucks (weighing up to ½ tonne). Heavy duty trucks will be only trucks defined for commercials purposes and not for personal transportation. The new rules which will really affect the US car fleet in the next 10-15 years is estimated by EPA and NHTSA to reduce the consumption of oil by 1.8 billion barrels over the lifetime of the vehicles sold during the 2012-16 period. If we assume the lifetime of these vehicles sold between 2012-16 is about ten years, then the reduction in oil consumption from the vehicles sold in this 5-year period equals about 0.5 million b/d. The tightening in the CAFÉ standards are however really set to gain pace after 2016. In the recently released Annual Energy Outlook by the EIA (released June 27) the table of CAFE standards improvements show that in the 2017-2025 period passenger cars will improve from 40 MPG to 56 MPG while Light-duty trucks will improve from 29.4 MPG to 40.3 MPG. For all light duty vehicles (which will be most of the US automobile fleet) the fleet will improve from 35.3 MPG to 49.6 MPG in the 2016-2025 time frame.



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# New CAFE Standards Equals Negative US Oil Demand Growth

- Despite our view of better economic growth by 2020 in the US than consensus, US oil demand will continue to trend lower

- Even though we do not believe the US will be able to perfectly comply with the new driving standards, it could be relevant to calculate approximately how much gasoline demand that could be killed off if we do see a linear build up to 2025 with perfect compliance by the car manufacturers.

- According to the oil consultancy PIRA there are about 252 million regular cars in the US (Including light trucks of course). Annualized automobile sales have stabilized at around 14 million vehicles in 2012. If we assume that the total size of the car fleet stays approximately flat (it will probably grow some with population growth, but let's not try to move too many parts at a time) and annual vehicle sales are 14 million, it will be sold 182 million new cars from 2012-2025. Every year about 5.6% of the fleet will be replaced. These new cars will then constitute about 72% of the car fleet in 2025 (and we can also assume that the newer cars will be driven more than the older cars, but let's keep this outside as well). The average efficiency gain during these 13 years (assuming linear build up) will be from 27 MPG today to 49.6 MPG in 2025. This is an average improvement of (49.6-27)/2/27=42% for those 72% of vehicles that have been replaced. 2011 US gasoline demand was 9.1 million b/d and could with the linear build up described above be reduced by 9.1*72%*42%=2.8 million b/d by 2025. This is a simple calculation and it will not progress as simple as this, but no matter if the real number becomes 1 million b/d or 4 million b/d it is a meaningful number and makes us confident that peak oil demand in the US has already been seen.

- As we have described above there will probably be some increased size of the total vehicle fleet, so the 72% share of the new cars in the fleet could be lower in reality, but weighing in the other direction will be that the newer, more efficient vehicles will be driven more than the older ones. Hence these two effects could net each other out. There is also empirical evidence that improved efficiency increases the driving length per vehicle, and we would assume that to take place as well. Nobody is however going to get this calculation correct. Our point is that no matter how you choose to calculate this, the efficiency gains are going to be large enough to provide meaningful reductions in gasoline demand. No matter if there will be some offsetting effects of longer driving length per vehicle in addition to a somewhat larger car fleet.

- The negative effects on oil demand based on the above discussed efficiency gains will mainly affect personal transportation and will probably be much more meaningful in a ten-year perspective than in a five-year perspective. In a five-year perspective we think the use of natural gas in the transportation of goods will make a larger contribution to reduced oil demand, but this will largely affect the diesel market rather than the gasoline market.



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# Natural Gas Set To Eat Into The US Transportation Sector

- The quickest effect will be on the transportation of goods, but personal transportation will also benefit albeit slower

- Total US demand for distillates with sulphur below 15 ppm was 3.4 million b/d in 2011 according to the EIA. Most of this distillate with the ultra low sulphur content is for road transportation. It is manly used by the large 18 wheelers that transport goods around the country. For this part of the oil barrel the “low hanging fruit” is even larger than for the personal transportation sector as the investments in infrastructure that is required for this type of substitution would be dramatically lower than what it would take to move the personal transportation fleet over to natural gas.

- The transportation of goods on US roads is generally moving on large diesel-trucks along the large interstate highways. These trucks drive the same routes over and over again. Hence it would not take many filling stations to move this part of the US transportation sector over to natural gas rather than moving on diesel. With the current spread between oil and gas prices there are massive amounts ready to be saved on operational costs by moving the large trucks to natural gas instead of diesel, and it seems for the first time in 2012 the market is starting to invest in this price spread being maintained at a large enough level to justify investing in it. Large scale economies still favour producing diesel trucks rather than LNG (natural gas) trucks. The cost to produce LNG trucks needs to come down in order to incentivize investments, but this is about to start happening. The more players that order this kind of truck, the cheaper it will become to produce. Large players like Volvo and UPS are now investing in these types of trucks and others are set to follow. The “ball has started to roll” and we believe it is not going to stop for a while. The incentive for US to stimulate this development is huge, not only because of less imports dependence from the Middle East, but also for the trade balance, for job creation and for environmental issues. Natural gas is cleaner than diesel.

- In March this year General Motors announced that the company will for the first time start to produce duel fuel vehicles that will run on both natural gas and on gasoline. This will be the 2013 model of Chevrolet Silverado and GMC Sierra Pickup. Pure CNG cars have been in production for a while, but we have more faith in these types of duel fuel vehicles, because with the possibility to run also on gasoline, the consumer worry of too few filling stations for CNG is drastically reduced. There are currently only about thousand CNG filling stations in the US and only half of them are open to the general public. Most of them are in California, Utah, Oklahoma and New York. GE and Chesapeake however announced in March that the companies are going to collaborate in expanding the number of CNG filling stations in the US. The first of 250 units should be in place already before the end of 2012. With the current spread between natural gas prices and oil prices, the consumers could cut the fuel costs in half by using natural gas (CNG) instead of gasoline. General Motors calculate that a consumer will save from 6.000 to 10.000 USD over a three year period by driving the new duel fuel trucks they plan to sell compared to pure gasoline vehicles and in addition the Obama administration has proposed tax credits of up to 10.000 USD for advanced technology vehicles.


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# US Shale Oil Output Is A Game Changer

- US production growth will be even larger than the reduction in demand

- The single largest effect on the global supply-demand balance for oil in the current decade is set to come from the immense growth in US shale oil production. Many commentators and analysts are still in denial when it comes to classify this new source of oil production growth as a revolution or not. We believe it is not a matter of asking weather this will be a revolution for oil production. It is already a revolution. Note that Texas oil production after 40 years of decline down to about 1.1 million b/d in 2010 has since increased to above 1.8 million b/d while North Dakota has increased production by about 0.5 million b/d since 2008. Almost all this increased output is from shale oil (more on what is new with shale oil later). Total US crude oil production is now (May is the latest official number from EIA) 6.3 million b/d. Average US crude oil production in 2010 was 5.5 million b/d so in 1.5 years US crude oil output is up a massive 15%, and that is after 40 years of decline until 2010. This is a revolution of the oil market – nothing less.

- It seems many analysts would like to see if the shale oil phenomenon can become a global issue before stating that this is a game changer. We on the other hand would already classify the shale oil revolution as a game changer, even if it should not become a global phenomenon until after 2020. So why is that?

- We believe the US shale oil revolution is a game changer for the oil market because it will most likely be enough to stop the super cycle in oil prices that has provided increasing average oil prices in nine of the last ten years. It might not be enough to send oil prices into the 50-80 $/b range but we believe it will provide enough barrels to stop the oil price from posting additional average increases in the coming years. We believe there is a large chance that the years 2011-2013 will be standing in history as the years with the highest average oil price (in real terms of course).

- If this shale oil revolution had happened in any other country than the US, we would probably not have attributed the same weigh to it, and it would probably not have been able to affect the global supply-demand balance to the same extent. The US is however the by far largest importer and consumer of oil in the world. US crude oil imports is currently about 9 million b/d. The global oil consultancy PIRA currently forecast US shale crude output to grow from 1.3 million b/d in 2012 to 4.1 million b/d in 2020, and increase of 2.8 million b/d in just 8 years. Most of this growth is currently forecasted to come from Bakken in North Dakota and from Eagle Ford in Texas. If we include US NGLs output growth and Canadian shale oil output growth, the growth in North American shale liquids output during the next 8 years is forecasted to be 4.6 million b/d. This is almost 0.6 million b/d per year until 2020.

- We believe it is relevant to include NGLs in the balance because with the current spread between natural gas and oil prices it even justifies investing in GTL plants in the US. With a GTL plant one can transform natural gas into transportation fuels, but even without this possibility the NGLs is a part of the global oil liquids balance.



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# So What Is Shale Oil – And What Is New About This Resource?

- Shale oil is only unconventional with respect to how the oil is trapped - It is light-sweet crude and can move directly to a refinery

- It is a lot of terminology that can be misunderstood about shale oil so let's try and clear this up so there are no misunderstandings about what kind of resource we are discussing when talking about "shale oil". Shale oil is not to be confused with oil shales, or what is also called Kerogen. Kerogen (or oil shales if you want) constitutes the building blocks of conventional oil, but are less matured and closer to the surface than shale oil. There are large oil shale (Kerogen) resources in the US, but it requires heating and processing to make these resources possible to refine by a conventional refinery. The extraction of oil shale (Kerogen) resembles that of open pit production of Canadian oil sands. This is an industry that is similar to mining. Canadian bitumen (oil sands) needs to be run trough an upgrader before it can be sold to a conventional refinery and making oil shales (Kerogen) useful for a refiner is said to be more expensive than the Canadian oil sand industry. Oil shale received more attention that shale oil plays until a few years ago due to it being closer to the surface and hence with the technology that prevailed at the time it was possible to access, while shale oil was until recently seen as impossible to extract economically.

- Shale oil reservoirs lies deeper than oil shale (Kerogen) and has had more time to mature to basically conventional high quality crude oil. The layers of shale oil can stretch horizontally for hundreds of miles and mainly consist of clay stone. The expression "Tight Oil" is not exactly the same as shale oil, because unlike shale oil the tight oil formations consist of siltstone or mudstone, without a lot of clay in the reservoir. "Tight Oil" is however extracted with the same techniques (horizontal wells and hydraulic fracturing) as shale oil. Most analysts include "Tight Oil" when referring to shale oil plays in the US, so it seems it will not make too much sense to separate tight oil plays from shale oil plays when discussing technology in use and production figures.

- The shale oil resources can basically be seen as the source to the conventional reservoir. The crude oil is formed under years and years of pressure in the source (the shale oil) and then by time migrates up to a "geological trap" which in the oil industry is the reservoir that the geologists have been trying to find. Broadly speaking the first trillion barrels of oil that the oil industry has extracted since the modern oil age started in 1859 has come from those conventional geological traps. Below every reservoir there is a source where the oil has migrated from. Geologists sometimes call the source "the hydrocarbon kitchen". The geologists have known about these "kitchens" for decades but the cost to extract this oil has been way to expensive because the technology had not developed adequately to allow economic production. Now this has changed through the combination of hydraulic fracturing and horizontal wells.


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# Hydraulic Fracturing & Horizontal Wells – What Is New?

- The only thing that is new is the combination of these two techniques - Each of the techniques are however not news at all

- It is very interesting to note that neither horizontal wells nor hydraulic fracturing are new techniques at all by themselves, but high oil prices can really make things happen with respect to creativity as we have seen several times before in history. We have seen videos with Texan oil men stating “what’s the big deal with fracing? I did my first frac-job in 1970”. In fact the fracturing technique is even much older than 1970. The technique was first used in the US in the 1940s. By 2002 a million fracturing jobs had been executed and currently about 95% of all wells drilled in the US is using hydraulic fracturing according to the National Petroleum Council. Commercial horizontal wells are a newer technology but have already been used quite extensively in the oil industry since the 1980s.

- The new thing is the combination of the above mentioned technologies, which in the starting phase was only attributed to the development of natural gas resources. First the operator drills thousands of feet vertically and then turns the well horizontally into the shale layer. Then the fracturing job starts. Large horsepower trucks pump chemicals, water and sand into the well with very high pressure. This cracks up the shale formations and allows gas and oil to flow up the well. These fracturing operations occur in multiple stages along the horizontal arm of the wellbore.

- The first large scale fracturing job with horizontal drilling was executed in Texas in year 2000 in the Barnett Shale formation. Still it took several more years until the market realized that a game changer had taken place for US natural gas and gas prices started to plummet. Until 2007 almost everyone believed that US Natural Gas prices could only go one way and that was upwards. Then US natural gas was trading at about 8 $/MMBTU. Gigantic irreversible investments were made to build import terminals for LNG into the US. The enormous Shtokman project in the Barents Sea was thought to contribute by exporting LNG to the US. Five years later everything is turned on its head. Natural gas prices in the US has collapsed and has during the spring traded as low as 2 $/MMBTU. We have a growing feeling that something similar is about to take place for the oil market.

- The game changer for the oil market is that for the last ten years the industry has moved towards smaller and deeper fields, resources further from the market, more complex projects, more resource nationalization, higher government take, etc, etc. The marginal barrels have to a large extent become ultra deep-water barrels. Then suddenly the marginal barrel is about to change from an offshore industry that has a lead time of 7-10 years until the cash flow turns positive to a land based industry that instead resembles a manufacturing process. The development of a large off-shore field will demand investments over several years and when the project is started these investments will not stop if the oil price temporarily falls. The shale oil industry is a completely different story with a lead time of only 1-3 years, where investments will quickly suffer if the oil price drops below break even, but again will restart quickly if the oil price again rises to economically viable levels.



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# How Large Are The US Shale Oil Resources?

- Estimates older than one year are mainly obsolete already

- To estimate conventional oil resources is not an easy task. It normally requires drilling of a couple of delineation wells to assess the recoverable oil. However that original estimate of course could change dramatically with adaption of new technology and more physical knowledge of the field building over time as it produces oil. It is even more difficult to estimate shale oil resources however. The enormous differences in permeability, porosity and thickness of a shale oil formation require many more than two exploration wells in order to make it possible to evaluate the recoverable oil in the whole formation.

- Based on the above it is a big problem that most official estimates of US shale oil resources are based on a few drilling wells measured early in the developing stage. The EIA estimates of recoverable resources of US shale oil published in July 2011 were based on research done when most of the US shale plays were approaching their first drilling tests. Hence the results of this report are probably not very trustworthy in our opinion and we expect large upgrades of the resource estimate the coming two years. By the second half of 2013 the USGS is targeting to publish a new estimate of total recoverable US shale oil resources.

- The shale oil revolution started in North Dakota in the Bakken field in 2006 and since then the oil production in North Dakota has exploded from 0.1 million b/d to now stand at 0.6 million b/d. It is interesting to note the development we have seen so far on the resource estimates for that particular field. The first assessment of Original Oil in Place (OOP) in the Bakken field was done by a geologist named Leigh Price in 1999, but he died before being able to publish his results. His estimates ranged from 271-503 billion barrels OOP. In 2011 the largest player in the Bakken field, Continental Resources, estimated OOP in Bakken at 500 billion barrels. For comparison purposes it is worth noting that Saudi Arabia was in 2005 said to have 700 billion barrels of OOP, while recoverable reserves for the kingdom is estimated in the latest set of BP stats to be 260 billion barrels.

- When it comes to estimates of ultimately recoverable reserves (EUR) the standing official estimate by the EIA is 3.59 billion barrels. In 1996 the USGS estimated the Bakken EUR to be only 0.1 billion barrels, but adjusted that upwards to 3.65 billion barrels in April 2008. The 2008 estimate by USGS was executed early in the learning curve for hydraulic fracturing on horizontal crude wells when drilling rigs in the state were few and recovery rates were low. Continental Resources however estimated in 2011 the EUR to be 20 billion barrels for Bakken (now revised to 24 billion barrels), but also stated that the Three Forks formation had the potential to double the reserves of the Bakken play. The global oil consultancy PIRA (which have recently initiated a large study of US shale oil) currently use 20 billion barrels EUR when modelling their production profile for Bakken shale oil output which they currently estimate will reach more than 1.4 million b/d before 2020.


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# Lower US Crude Imports Means More Barrels For Others

- US shale liquids could become the world's marginal barrels

- If indeed US demand for refined oil products decreases 1-3 million b/d by 2020, due to the earlier discussed efficiency and substitution effects, and at the same time US crude production increase by 3 million b/d due to the shale oil revolution, we are looking at about 5 million b/d lower imports needs for crude oil by 2020. Is this large enough to have a negative effect on the price formation of crude oils? We believe the answer is yes. Currently many of these new shale oil barrels are landlocked by lack of transportation infrastructure (pipelines) to reach the cluster of US refineries which are mainly concentrated at the Gulf of Mexico (GOM). This is of course the main reason for the currently large price spread between Brent and WTI. Within the next three years however much of this bottle neck will be solved with new pipeline infrastructure. More than 3 million b/d of new pipeline projects are scheduled to come on stream before the end of 2014 to solve the Midwest bottle neck, and in a 2020 perspective we do not think this current lack of infrastructure is set to be a major obstacle in securing that the crude oil reaches the refiners in the GOM.

- If within 2020 the US is only importing 4 million b/d of crude oil instead of 9 million b/d, it means Europe and Asia will be able to get their hands on the pushed away 5 million b/d. These 5 million b/d will then replace the declining North Sea production and fill in for continued demand growth in Asia and other emerging markets. By 2020 the US is set to continue to import crude from Canada, Mexico and Venezuela. Imports from Brazil, Columbia and Trinidad and Tobago are in danger, while imports from West-Africa, Persian Gulf (PG), Russia, Norway and UK will drop to practically zero. Broadly speaking the West-African barrels will instead be heading to Europe and the PG barrels will instead go to Asia.

- Based on the above there is a good chance that the US shale liquids production will become the marginal barrels of the world's supply. Currently the marginal barrels of the world's oil supply are Canadian oil sands, Biofuel and Ultra-deep water. The break even cost for US shale oil production is broadly estimated in a range from 55-75 $/b, including 10% cost of capital. This implies that if US domestic crude prices fall below 80 $/b it will negatively affect the growth in this industry. But looking 8 years ahead is it more plausible to assume falling or rising costs to produce these barrels? To us the answer to that question is pretty clear. The costs will fall. History suggests that the cost for technology will decrease rather than increase. It is also a point that so far the US shale liquids industry has been run by smaller independent companies. The oil majors are just entering "the party". The bigger players are likely to be better in streamlining all the processes involved in our opinion. We have heard arguments suggesting that since the players will extract the best reservoirs first, the cost for extracting oil from the poorer shale plays will go up. Hence the cost for shale liquids production will move up. We do not believe this will be the case. The same could be said for shale gas production, but costs for producing shale gas have gone down rather than up. Since 2007 the cost of drilling a shale gas well in $/foot has been cut in half. We think something similar will happen to the shale crude production costs.



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# Shale Liquids Production Is A Manufacturing Industry

- … and hence risk pushing difficult and expensive offshore industry out of the market (like what happened to Shtokman)

- Some analysts argue that the decline rate in shale oil production is so severe that growth in production will soon be difficult. New wells have to be drilled all the time. They compare with normal decline rates in conventional oil production which is much lower. Also for conventional offshore production the decline rates are much less steep than for shale liquids production. For most analysts the typical non-OPEC project is offshore with a 5-10 year investment phase before cash starts flowing back in. We agree that decline rates per drilled well looks to be much steeper for shale oil than for conventional production. For many wells 80% of the resource is said to be produced within the first two-three years. The shale oil industry is however another type of industry and it might not be relevant to discuss decline rates in the same manner as we have been used to for conventional oil production. It could be that we are mixing apples with oranges. The problem with the argument in our view is that this new shale oil industry might be more similar to a traditional manufacturing process than how we have come to see the oil industry the last ten years.

- In a traditional manufacturing process you will produce your output as long as you are making a positive cash flow on the sales of your products and as long as there are no lack of input factors. One can say the same for the shale oil industry. As long as there are enough resources available and as long as the oil produced can be sold with a positive cash flow, the oil will be produced. Decline rates might not mean that much in such an industry. You drill and move on as long as you have acres available. The lead time from investment to first oil could be as short as a year for these shale oil projects. It is not like the offshore oil industry we know from Norway for example which demand large, irreversible investments and where you will not see any positive cash flow until many years ahead.

- Since the lead time from investment to cash starts flowing in is so short in the shale oil industry, maybe it is more reasonable to see the investment as operational cost instead of capex? It almost becomes like refining. If the margin disappears you throttle back output to save operational costs, but you quickly ramp up if the margin comes back. Why would decline rates be important in an industry with such a short lead time? Every drilled well can be seen as operational costs rather than capex and you just drill and move on and drill and move on as long as the resources are there. The rig used for drilling the well does not have to be left there while the well produces. Hence the question is rather if you believe the resources are there to a large enough extent that the production growth can continue. We believe the resources are there.

- For Norway the danger of this new industry is that it will be a competition to produce our barrels cheaper than what the Americans can do. If the break even price for shale liquids production in the US drops to lets say a 45-65 $/b range and the Arctic barrels we believe we have in the Barents sea requires 90 $/b to see the final investment decision, the Norwegian barrels might be competed out of the market. There might not be any need for these barrels. The best example of such a situation in real life is what happened to the Shtokman project. The gas from Shtokman basically became unnecessary to produce after the US shale gas revolution.

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# What If Shale Liquids Become A Global Industry?

- The US shale liquids story is alone enough to stop the upwards move in oil prices. What then if this becomes a global industry?

- So far we have only discussed the US shale gas and shale liquids industry and the consequences it will have for the global oil market and oil price formation. What will happen if this industry becomes a global issue rather than just a US phenomenon?

- As far as we know, there has so far been no attempts to estimate the ultimately recoverable reserves for global shale liquids, similar to the estimates published for global shale gas resources by the EIA from April last year. Last years EIA report assessed 48 shale gas basins in 32 countries, containing almost 70 shale gas basins. The countries and basins were selected based on availability of data, country-level natural gas import dependence, observed large shale gas basins and observed activities by companies. As we already know, shale gas was a game changer for the US natural gas market. As such it is interesting to note that in the EIA assessment for global shale gas resources, the Energy Administration estimated that shale gas resources are even bigger in Latin America, Africa and in China than what they are in the US. The same could be the case for shale liquids, but it is still too early days to say how large this could be globally. It is also interesting to note that Russia, Central Asia, Middle East, South East Asia and Central Africa were not even assessed in the EIA report.

- What is certain is that wherever there is a reservoir, there has to be a source that lies deeper from where the oil has migrated from (the kitchen). As such there is every reason to believe that these global resources are enormous. As an example of the potential it is worth mentioning a report written by a Sanford Bernstein analyst published in Forbes in June. According to the report there is a shale liquids field in Western Siberia called “The Bazhenov” that covers 2.3 million square kilometres or 570 million acres, which is the size of Texas and the Gulf of Mexico combined. This is the same as 80 times larger than “The Bakken” in North Dakota. Exxon has recently left Poland to instead invest in shale oil resources in Russia together with Rosneft, so the company obviously assess the resources in place to be large enough to ignore the political risk associated with investing in Russia. The report says that the test wells so far exhibits results in line with the Bakken average. There will of course be large infrastructure challenges by developing shale oil in Western Siberia, particularly in the summer due to the softer ground, but it is likely that there are large resources present. The Sanford Bernstein analyst estimates that if 300 rigs could be put to work in this field, it could produce 1 million b/d by 2020. Western Siberia is an example of an area that has produced conventional oil for a long time and there is already a lot of oil infrastructure in place like pipelines and rail capacity.

- A country like Saudi Arabia probably also have huge shale liquids resources below it’s reservoirs, but since the Saudi barrels are so inexpensive to produce and they still have conventional resources left to develop, there is no economic incentive to exploit shale just yet. Even if we do believe there must be large shale liquids resources also in other countries than the US that does not mean they will be as cheap to develop. We hence still believe the age of “cheap oil” is over but in our view there will not be a any lack of resources as long as the oil price is high enough for them to be developed.


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# Current Supply-Demand Trends Suggest Lower Call On OPEC

- If we stretch the current data trends (12-month moving average IEA-numbers) towards 2015, the call on OPEC will decrease

- As we have already stated in the start of our report, we believe the oil price has itself contributed in balancing supply-demand in the oil market. Demand has weakened (and not only because of cyclical factors) and supply is on the rise.

- For several years we have been monitoring the large trends in the market, to gauge if there are any meaningful changes to be spotted in the numbers. Until the spring of 2012 we have not seen any changes large enough to make us change our view that oil prices would have to continue to trend higher (like they have now done for 9 out of the last 10 years). The largest top level trend since 2003 has been that global oil demand growth has been much higher than non-OPEC supply growth, enabling OPEC to increase its market share and draw down its spare capacity. The only exception from this trend since 2003 was in the 2008-09 recession, but since 2010 we have seen a gradual weakness in this relationship.

- In the 5 years from 2003 through 2007 we saw global demand growth surpass non-OPEC growth on average by 1.4 million b/d, while in 2008-09 non-OPEC growth outpaced global demand growth by 0.7 million b/d. Then in 2010-11 global demand growth outpaced non-OPEC growth by 1.2 million b/d on average, but the last 12 months this relationship has been weakening and the average is now only 0.2 million b/d larger global oil demand growth vs global non-OPEC supply growth. It might not take that much longer before non-OPEC supply growth is outpacing global demand growth, which if it happens is probably not compatible with continued increases in oil prices.

- During the spring of 2011 the supply-demand trends were suggesting that the world would need almost 9 million b/d more oil from OPEC to balance before 2015. We then claimed this would not be possible for OPEC to deliver and hence oil prices would have to stay strong in order to keep demand growth in check. Then year on year OECD demand growth was 2% while non-OECD demand growth was 5% (on a 12-month moving average basis using IEA-data). Non-OPEC supply was then growing a quite decent 2%, but demand growth was so much stronger that higher prices seemed unavoidable.

- Currently the demand for oil in the OECD is down 1.5% while it is up 2.7% in the non-OECD. Since we have seen a lot of non-geological hiccups in non-OPEC production the latest year (Buzzard, Bohai Bay, Azerbaijan, Sudan/South-Sudan), non-OPEC is only up 0.6% vs last year. Even with this weak growth in non-OPEC production it looks as if we will not need any more oil from OPEC to balance the market before 2015, unless we see a large revival in global oil demand. The growth in US shale liquids will however just continue to rise and it is quite likely that some better production growth numbers will start to emerge from non-OPEC during the coming year.



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# Some Clarification Around Field Decline Rates (1)

- *Net* field decline rates are probably lower than most people think - Gross (or natural) decline rates are not that interesting

- It seems to be appropriate to write a little bit about field decline rates in this report because we regularly hear from commentators and several analysts that global field decline is higher than 6%. If for example field decline is 6.7% the world would need to find and develop about 40 million b/d of oil resources before 2020. There is no need to worry about these figures. We do not need to find and develop that many barrels before 2020. First of all the ***net*** decline rate is not 6.7%, even if the ***natural*** decline rate for ***fields that have passed their plateau*** production could be at that level. The other important issue to note is that the worlds 360 largest oil projects (which we obviously do not need to find, and which of course are not in decline) will alone provide about 26 million b/d of increased production from now to 2020.

- Let's first discuss decline rates. In it's World Energy Outlook for 2008 the IEA conducted a large study on field by field decline rates based on a database mainly obtained from IHS-CERA but added also data from USGS, Deloitte & Touche and EIA. Based on it's study the IEA concluded that the average decline rates world wide is 6.7% for ***post-peak fields***. The key word is as highlighted ***post-peak fields.*** IEA clearly states in their report that "for the purposes of our decline rates calculations, only fields that have reached post-plateau production are included" (page 235 in IEA WEO 2008). In the agency's definition post-plateau broadly means that output from the field has fallen to below 85% of the peak level. We all know that not all the worlds currently producing oil fields are post their plateau in output. This of course means that one cannot apply the 6.7% decline rate on the 2011 oil liquids production base of 84 million b/d. Total liquids output was 88.3 million b/d but that included processing gains of 2.2 million b/d and biofuels of 1.9 million b/d, and those parts of the liquids supply should not be exposed to calculated decline rates.

- IEA's study was meant to give information on how much a ***field that has reached it's plateau*** will decline in production every year, but our current oil liquids production base of about 84 million b/d does not consist of only fields that have reached peak-plateau. So what kind of decline rate should we use when deducting barrels from the current 84 million b/d? This is an extremely difficult task and nobody is going to get it correct as each different field's decline rate will depend on lots of different factors and geology is only one of them. Changes in technology, government take (tax) and investment levels are examples of factors that affect net decline rates as much as pure geology.

- It is probably better to keep the decline rate exercise pretty simple and keep it a bit more top-down instead of risking huge errors because you miss out on the tax rate, technological break troughs or the level of investments. One simple way of looking at decline rates would be to deduct from global non-OPEC output the added production from the largest projects that we know about the latest ten years and then see what output would have been like without these large projects.

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# Some Clarification Around Field Decline Rates (2)

- *Net* field decline rates are probably lower than most people think - Gross (or natural) decline rates are not that interesting

- This exercise was done in a large report published by Goldman Sachs in March where the world's largest 360 oil projects were mapped. The result of deducting the production additions from these projects from non-OPEC supply since 2002 shows that in the period from 2003 to 2008 ***net*** decline rates were accelerating from no decline in 2003 to almost -3% in 2008. In 2009-2011 however the ***net*** non-OPEC decline rate has been reduced to less than -2%. This kind of decline rate level was recently confirmed in a study published by Leonardo Maugeri for Harvard Kennedy School where he states that apart from Norway, UK, Mexico and Iran he could not find evidence of a ***net*** global decline rate of crude production higher than 2-3%. He also makes the point that if we assume the ***net*** decline rate in the last decade had really been between 6-10% we would have lost almost all the year 2000 crude oil production capacity of 70 million b/d by 2010. He might have miscalculated a bit here however, since a 6% decline rate for those ten years using 70 million b/d as capacity in year 2000 would still have left us with 32 million b/d in 2010. Since 2010 crude production capacity was about 80 million b/d a 6% ***net*** decline rate would suggest that 70-32+10 = 48 million b/d of new production capacity has been brought on stream from 2000 to 2010. That seems like an unlikely high number to us. According to the mentioned Harvard study about 70% of the crude produced in 2010 came from oil fields that had been producing for decades and not from new start ups after 2000. Hence the ***ne***t field decline must be much lower than 6% we believe.

- Based on the above we believe it is much more plausible to use a ***net*** decline rate of 2% in a broad calculation of how much additional oil production we would need to replace by 2020. Keep in mind that out of the currently 84 million b/d oil liquids production base (excluding biofuels and processing gains) a fair chunk of the fields are in ramp up; they are not all in decline. If we use a 2% ***net*** decline rate we will loose 14 million b/d out of the 84 million b/d by 2020. In addition we think there will be some demand growth due to continued economic growth in the developing world, coupled with urbanization and population growth. We believe global oil demand will grow below trend (1.5%) during the current decade, since efficiency gains and substitution to other energy sources than petroleum will take its toll on oil demand in OECD. But for the sake of the argument let's assume that global oil demand grows at trend until 2020. We would then need 12 million b/d more oil by 2020. Add demand growth and decline rate together and we need to come up with 26 million b/d from now to 2020. Will that be a problem for the global oil industry to come up with those barrels? We think probably not.

- According to the already mentioned Goldman Sachs study, the top 360 projects that we already know about will alone be able to increase production by 26 million b/d by 2020. The above mentioned Harvard study estimates that production from the top 23 oil producing countries in the world will increase by a ***net*** 29 million b/d by 2020 based on bottom up field by field analysis. If all projects go forward as currently planned by each separate project owner the number is as high as 49 million b/d, but the author of the report have risk adjusted each project to come to the mentioned 29 million b/d. The Harvard study describes this increase in output capacity in the current decade as "the most significant increase in any decade since the 1980s".

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# There Will Still Be Supportive Factors (1)

- The mega drivers behind growing oil demand in emerging markets are still not over

- Demand for oil in the emerging markets (non-OECD) has now reached half of the global market share. Ten years ago the market share for these developing countries was less than 40%. The main drivers behind this immense change has been economic growth (a huge movement of people from poverty towards the middle class), continued population growth and continued urbanization. The key region has been Asia, which is the home of more than half of the world's population. In 1970 the UN estimated that about 86% of the poor people in the world lived in that region while the forecast is for that share to drop to only 25% by 2015.

- We don't believe any of the above mentioned drivers are set to stop in a 2020 perspective and hence forecast that the non-OECD market share of global oil demand will just continue to increase in the current decade. It is however probably not sustainable to see the Chinese economy continue to grow trend line 10% also in the coming ten years. Too much of the Chinese economic growth has been coming from investments rather than consumption in order to make this level of growth sustainable also for the coming ten years. During the last 5 years roughly half of the global economic growth has been coming from China but China in fact becomes even more important when discussing global oil demand growth. The average global oil demand growth for the last 5 years (2007-2011) is 0.8 million b/d. Out of this growth, 0.5 million b/d has been from China. So far in 2012 we have seen weaker demand from China than the trend-line 0.5 million b/d seen the latest decade. First half 2012 oil demand growth in China has been a weak 0.2 million b/d. We do think the second half of the year will provide stronger numbers on the back of monetary stimulus, but we do not think we can count on Chinese economic growth to average more than around 7-8% in the coming ten years which will be about 2-3% lower than what we have seen the latest ten years.

- Based on this we will probably not see Chinese oil demand continue to grow as fast as we have seen the latest ten years. Efficiency gains in the car fleet and substitution towards natural gas in the stationary energy sector will probably also contribute to this. Hence a Chinese oil demand growth of 0.3-0.5 million b/d in the coming ten years probably looks more realistic. Chinese GDP growth has fallen from 10.5% in 2010 to 9.3% in 2011 and looks to be around 7.9% in 2012. During the same years the Chinese oil demand growth has fallen from 0.9 million b/d in 2010 to 0.5 million b/d in 2011 to 0.2 million b/d so far in 2012. Our macro economists GDP forecast for China in 2013 is 7.5%. This does not bode for any better oil demand growth than what we will see for 2012. Our main point when it comes to oil demand growth in the emerging markets, where China obviously is the most important country, is that we do still expect growth but not as strong as we have seen for the last ten years. We think a soft landing is more plausible than a hard landing for economic growth in this region. This also implies softer yearly oil demand growth in the coming ten years from non-OECD in our opinion. The growth in oil demand in the non-OECD will however probably be high enough to more than offset the weakness we forecast for OECD (particularly US and Europe), and hence secure net global oil demand growth. The net global oil demand growth in the coming ten years might however not be higher than the global growth in non-OPEC production.



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# There Will Still Be Supportive Factors (2)

- Geopolitical risk will not be lower in the coming years – This adds both upside potential and downside support for oil prices

- Since non-OPEC production growth has disappointed the last ten years and hence forced OPEC (read Saudi Arabia) to produce more, the current core OPEC spare capacity is very low at about 2 million b/d which is about 2.3% of global oil demand. Hence the global oil industry is running at almost a 98% utilization rate. This is of course very high and makes the geopolitical risk relating to North Africa/Middle East all the more important for the oil price formation. The general geopolitical risk in this region is not set to fall in the coming years as the demography is still extremely skewed from more peaceful western nations. The region is generally full of young, unemployed males and after the internet revolution they also have access to information. This means we should continue to see a risk premium in the oil price also in the coming ten years which should not be any lower than the prior ten years. We can be quite certain that supply shocks will happen in this region, we just don't know where or how big the lost production will be. Libya fell out last year with more than 1.5 million b/d, this year it's the embargo and sanctions vs Iran that has removed almost 1.5 million b/d from the market and in addition we have lost many barrels from Yemen, Syria and Sudan/South Sudan. The current almost civil-war like conditions in Syria risks unleashing a larger sunni-shiite conflict in the whole region. Hence the risk of a supply shock means one can never rule out an upside "explosion" in the oil price but this does not mean we can have that as a base case in our forecasted oil price deck.

- The Arab spring is not only adding upside potential for the oil price it is also adding downside support, since many of the OPEC countries have been forced to spend billions of dollars on social programs in order to try to avoid social unrest. Saudi Arabia has for example increased the costs in its state budget by 54% from 2008 to 2011 according to IMF. This is manly due to social programs initiated to avoid social unrest in the world's largest oil exporter. The consequence is that while the kingdom needed less than 50 $/b to balance the state budget in 2008 it needed more than 80 $/b to balance the budget in 2011. If the costs continue to increase 15% per year (which is the 5-year average) the country will need an oil price above 140 $/b by 2015 to balance its state budget.

- The problem with balancing the state budget poses a large dilemma for Saudi Arabia, because it knows that an oil price average of 140 $/b in 2015 will destroy the oil market. Hence the discussion of how high oil prices Saudi Arabia is targeting is not as simple as one might initially imagine. Currently the kingdom probably targets around 100 $/b Brent prices. This seems plausible after several statements from the oil minister Al-naimi during 2012. In a CNN interview on January 16th this year he stated "Our wish and hope is we can stabilize this oil price and keep it at a level around 100 $/b". Last summer on June 8, when asked if Saudi Arabia still favoured an oil price of 70-80 $/b his answer was "That was several years ago". But does this mean that all players and investors that need an oil price above 100 $/b can just relax and trust on Saudi Arabia to cut back if necessary to defend that price?



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# What Is The Saudi Price Target?

- Short term it is probably 100 $/b but what could it be in 2015? Do we risk a Saudi flooding like in 1986-91 before year 2020?

- As we stated above the Saudis are on track to need 140 $/b to balance its state budget in 2015, but this will not be sustainable for the oil market in the longer term and we believe the kingdom is aware of this. There are several factors that count for the Saudis targeting higher oil prices. This would be factors like taxation is consumer countries (OPEC countries has always been annoyed that for example a country like Sweden earns more on oil through taxes at the pump than what the producers do themselves), political pressure from other OPEC countries that needs a higher oil price than themselves (Venezuela, Iran, etc, etc) and a weaker USD which destroys the Saudi purchasing power from the oil sold. The most important argument will however be the balancing of the state budget.

- There is however also factors that counts for Saudi Arabia targeting lower prices. There is political pressure from the large consumer countries with US in the front, but probably more important is the longer term sustainability of the oil market. We should not discuss OPEC as one homogeneous, uniform group. Most of the leaders in these countries are dependent on satisfying their population every year in order to stay in power. It is different with a country like Saudi Arabia. Saudi Arabia has been run by the same family for the last 110 years and the royal family probably expect to control the kingdom for the next 50 years as well. The rulers can afford to think about the oil market in a longer term perspective than most of the other cartel members. They want to maximise the revenues from oil in the longer term, not only the next five years. This probably means that the Saudis will think of this market very differently than the rest of the cartel where many members are only focusing on maximising the oil price at all times.

- A scenario could play out by 2015 (even though it would not be our base case) were Saudi Arabia has been forced to cut production from today's 10 million b/d down to 7-8 million b/d in order to maintain oil prices in the 90-110 $/b range. If the kingdom at that stage evaluate that it will have to continue to cut production and hence loose market share to maintain prices at the mentioned range the kingdom may choose to repeat the flooding of the market that it carried through in the 1986-1991 period. In this period the Saudis flooded the market after having lost significant market share from 1979-1985 due to both the global economic recession but also massive supply growth from non-OPEC were Mexico, Alaska and the North Sea were the main contributors to the growth. The Kingdom was not happy about loosing market share and went to so called netback pricing to regain its market share. That meant a guaranteed margin for it's refining customers and suddenly the market was flooded with oil during the 1986-1991 period. The average oil price for Brent had been 32 $/b in the 1979-85 period (despite the recession in that period) but the price was practically cut in half during the 1986-1991 period. Our point is that since Saudi Arabia may evaluate the oil price in a longer time perspective than the other cartel members it could be beneficial for the kingdom to repeat the 1986-91 exercise from time to time. The kingdom would then achieve protection of longer term oil demand and make the transition period to another world energy mix longer. In addition it would "shoot down" non-OPEC projects like shale liquids in the US. Hence an oil price of 50 $/b for a couple of years may not be all that bad for Saudi Arabia if thinking in a long term perspective. I would protect the kingdom's long-term market share.



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# Shorter Term Oil Prices

- We think 2H-2012 prices will be stronger than Q2-2012, but the average 2013 price will be lower than the 2012 price

- For the second half of 2012 there are lot's of different factors that will have the potential to affect crude oil prices but only a few of them will probably be in focus at a time.

- Bullish factors that could affect oil prices are things like:
  - Seasonal upswing in demand, refineries coming out of maintenance to solid margins, geopolitical risks in the middle east – particularly relating to the Iranian nuclear program, hurricane season in the Atlantic, Iran embargo/financial sanctions (how many barrels will be affected? – it looks to be more than initially expected), seasonal north sea field maintenance, still cargoes moving from North Sea to Korea due to trade agreement (3% lower tax), seasonal lower exports capabilities in Saudi Arabia (burning crude to generate power in the summer), break even prices for Bakken shale crude in North Dakota is not too far above the current market, a possible QE3 or general increased liquidity would be positive for oil prices (EU bank package or buying of government bonds, possible action from the FED, lower interest rates in China, EU, etc, etc).

- Bearish factors that could affect oil prices are things like:
  - Weak global fundamental balance despite the lost barrels from Iran, high oil inventories (US was at record levels since 1991 this summer and OECD inventories in days of demand coverage are in fact on the high side), a possible SPR release if the price increase back towards 120 $/b (US elections…), euro crisis, weak demand growth - macro economic numbers, Chinese oil-data has been weak recently – need to pick up the next 6 months for prices to rise further, Chinese SPR buying could be all done for 2012, the US shale liquids revolution has started to price into the back end of the curve - if a critical mass start to believe US will become net zero oil importers this will price in many years before the imports independency actually happens.

- Out of these bearish and bullish factors we would emphasize the geopolitical risk related to Iran and new fear that Israel could attack and also the upside risk of central banks adding liquidity to the markets. Hence we believe the oil price will be stronger in Q3 and Q4 than what we have seen in Q2 which averaged 108 $/b. Our forecast in our April report called for Q3 and Q4 to average at 114 $/b and 116 $/b respectively. These forecasts are now revised lower to 110 $/b and 109 $/b respectively. This means our total 2012 forecast is revised down from 115 $/b to 111 $/b. This is in fact the same as the average price was in 2011.

- When it comes to the forecast for 2013 please look at the 2013 score card for the detailed arguments. Our April forecast was 120 $/b, but mainly due to a lower call on OPEC we revise this down to 107 $/b. The 2013 forecast is still relatively high as geopolitical risk will still be high, particularly due to the situation concerning Iran's nuclear program and a possible military attack by Israel/USA.



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# Appendix

Graphs & pictures to underpin the story



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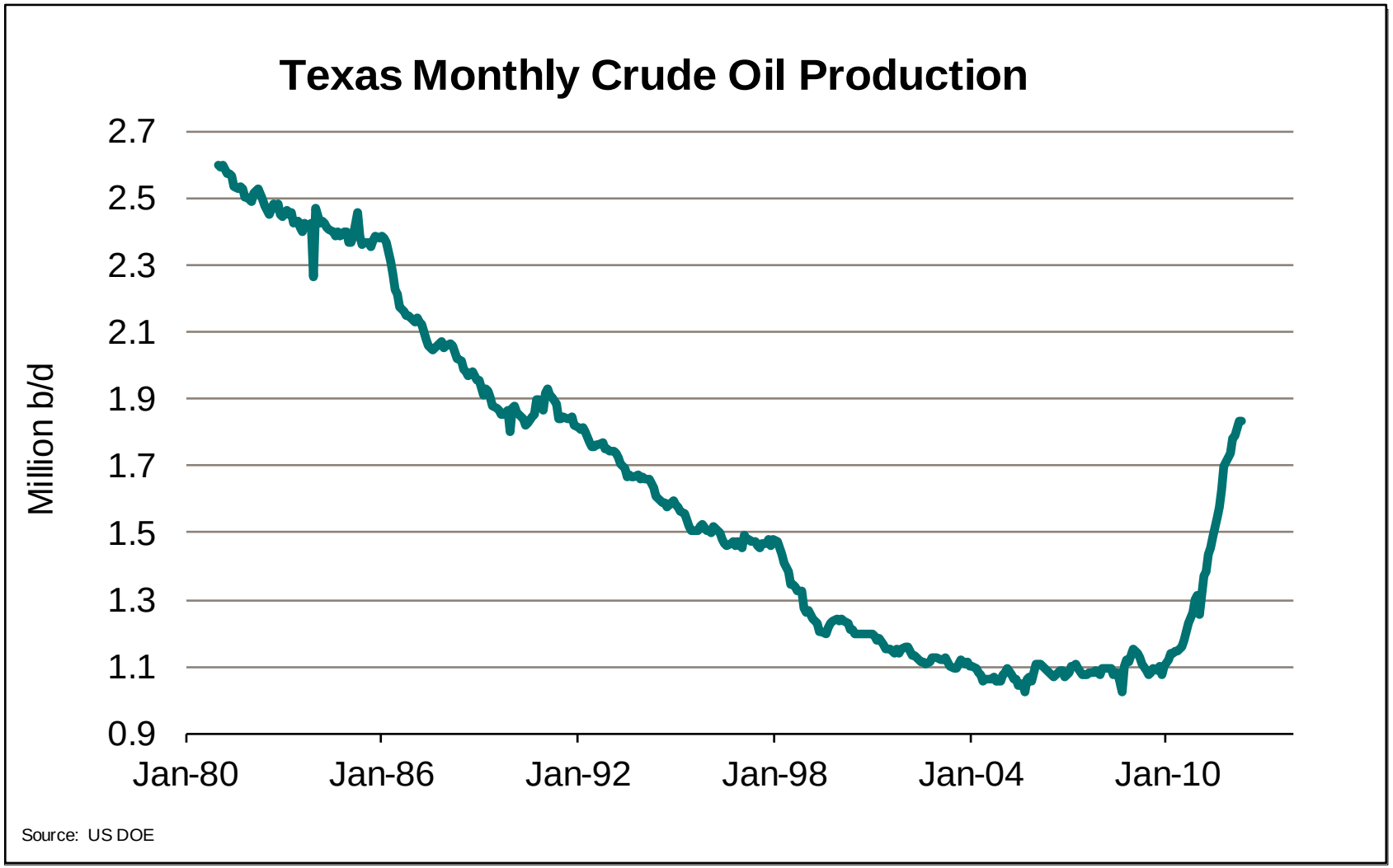
# The Key Oil Graph Of Year 2012

- After having declined for about 40 years Texas oil production is now “exploding” to the upside







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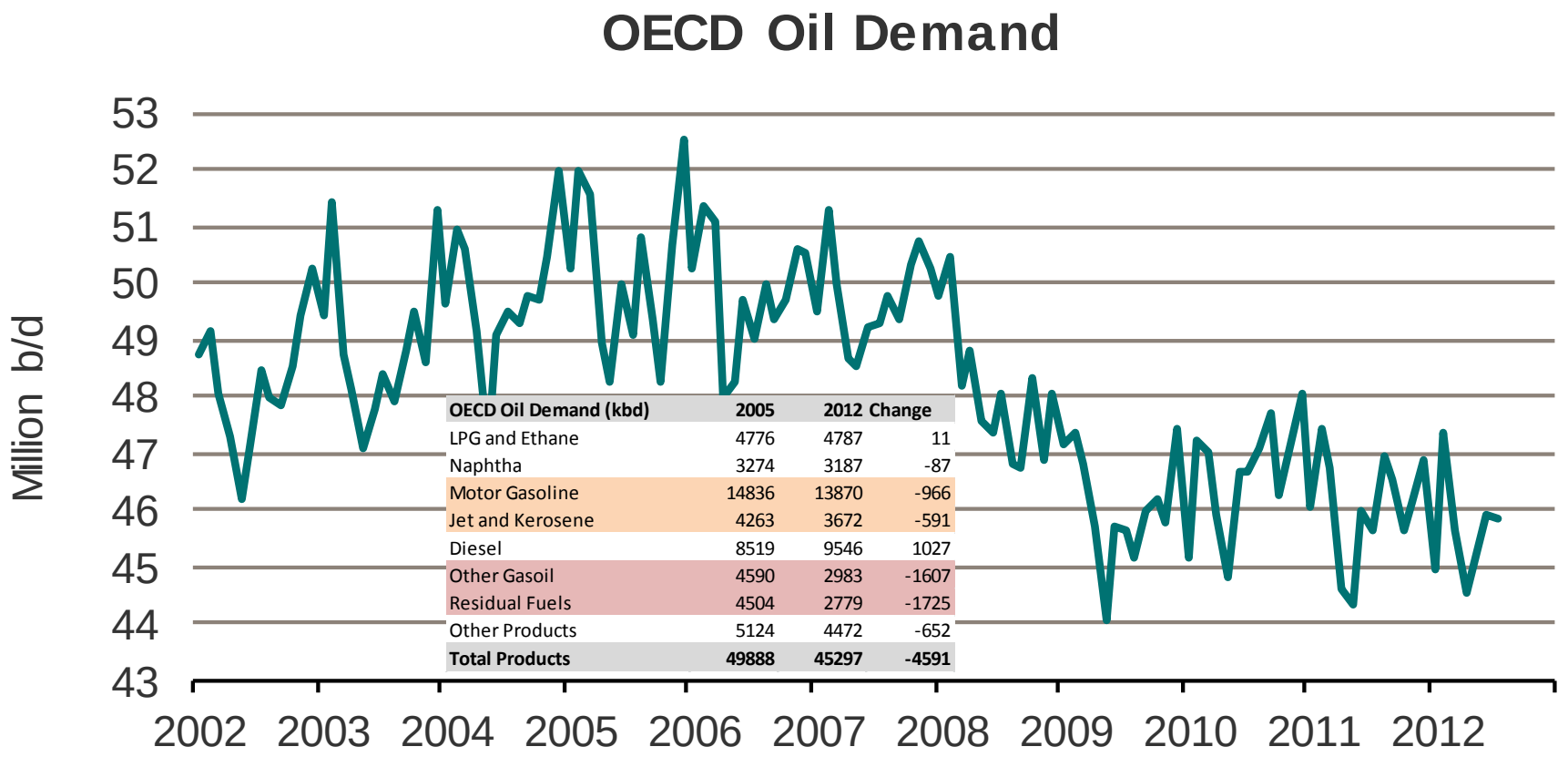
# Peak Oil Has Already Happened

- At least when talking about demand in the developed world – and a large chunk of is looks structural and not cyclical




| OECD Oil Demand (kbd) | 2005 | 2012 | Change |
|---|---|---|---|
| LPG and Ethane | 4776 | 4787 | 11 |
| Naphtha | 3274 | 3187 | -87 |
| Motor Gasoline | 14836 | 13870 | -966 |
| Jet and Kerosene | 4263 | 3672 | -591 |
| Diesel | 8519 | 9546 | 1027 |
| Other Gasoil | 4590 | 2983 | -1607 |
| Residual Fuels | 4504 | 2779 | -1725 |
| Other Products | 5124 | 4472 | -652 |
| **Total Products** | **49888** | **45297** | **-4591** |

Source: IEA

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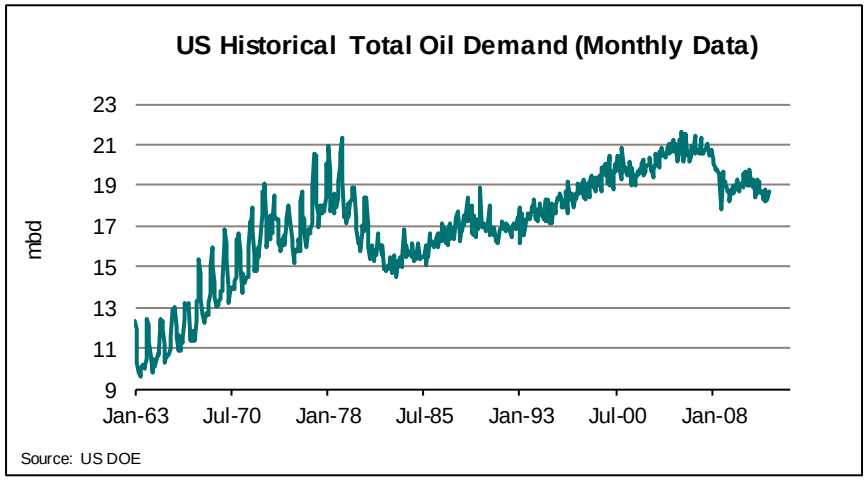
## Overdose

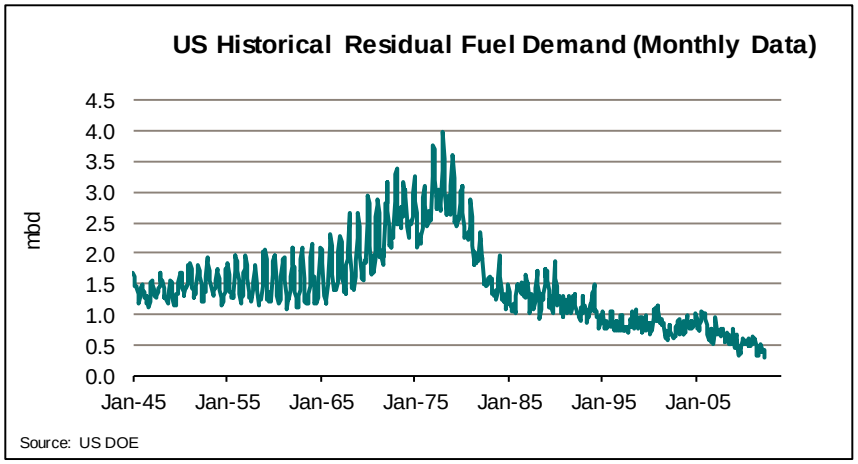
*"You're a habit I don't wanna break*
*just write on my grave*
*I overdosed on you"*
*(AC/DC  - Let there be rock)*

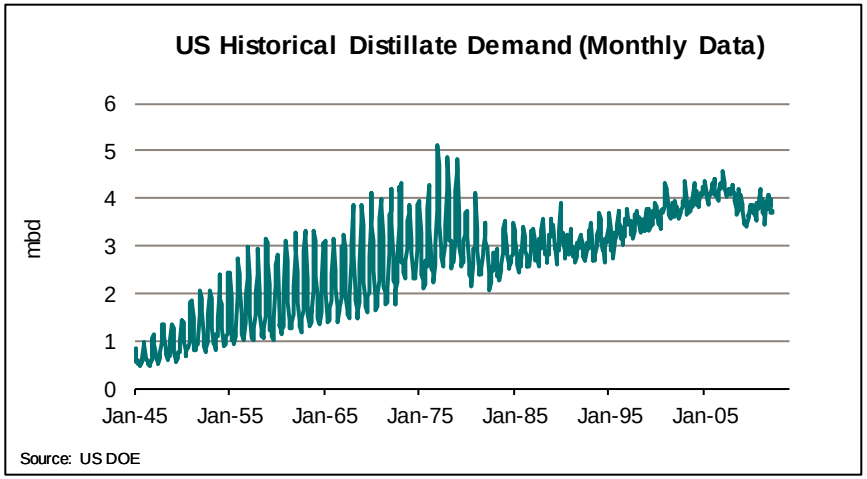
*The US has however been on a very good track in recovering from it's addiction to oil after it's overdose. The country has recently turned into a net oil products exporter.*

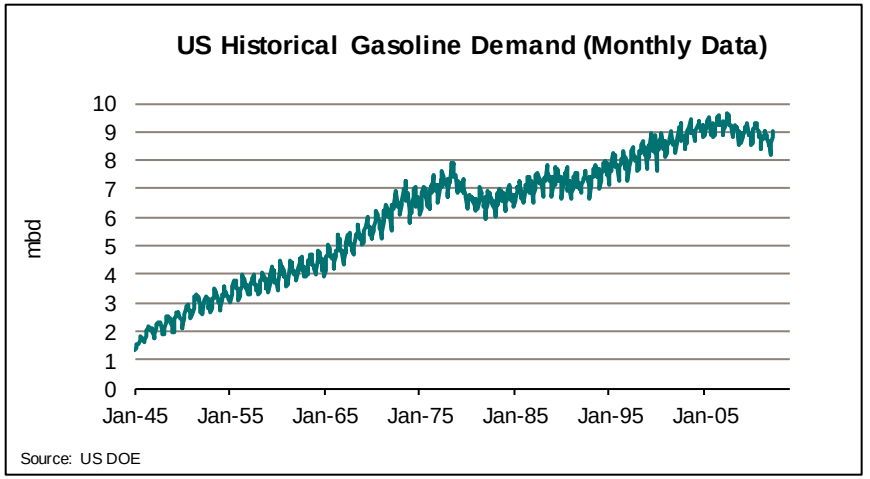
# US Oil Demand Will Never Again Surpass 21 Million b/d

- Although a decent chunk of the demand weakness since 2006 is cyclical, we see structural changes “around the corner”

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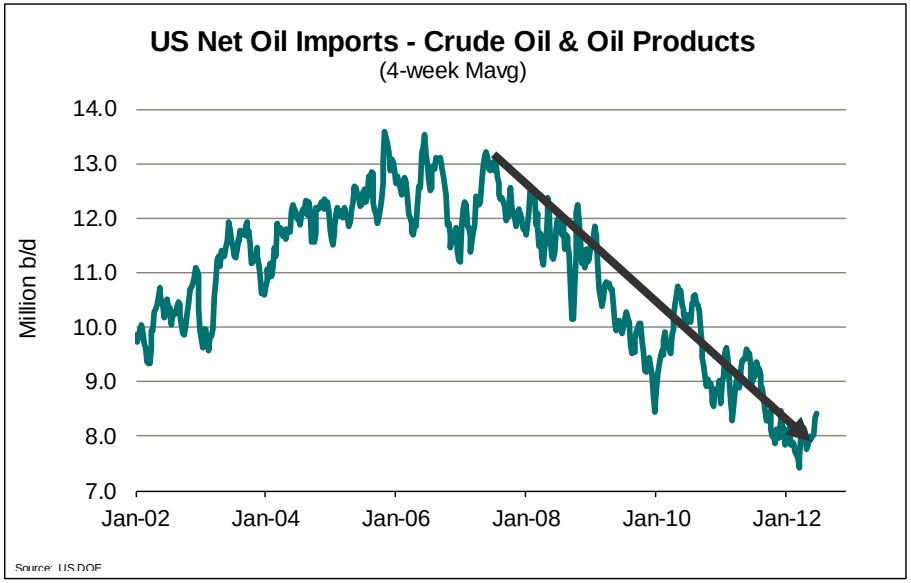
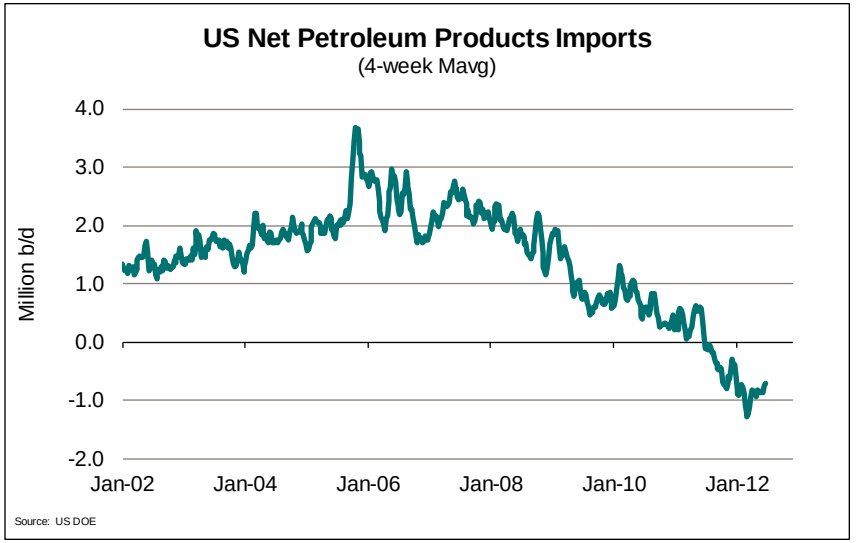
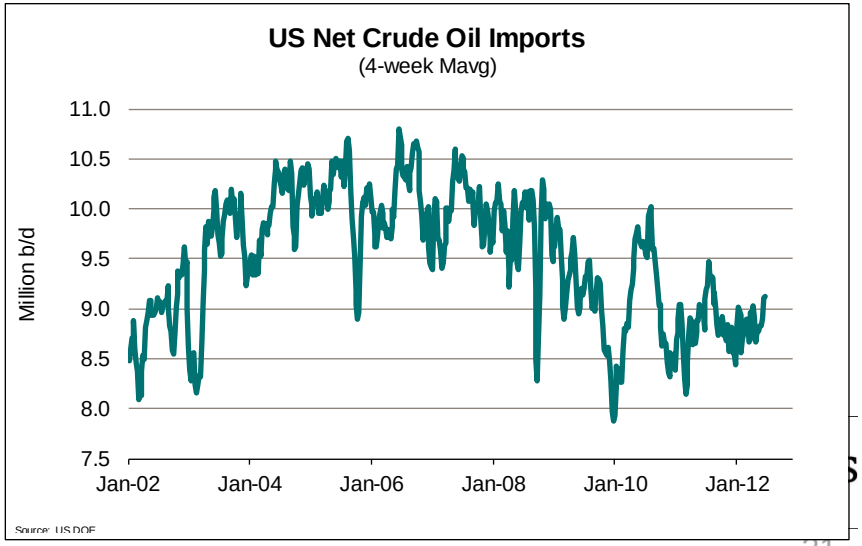
# US Reducing It's Addiction To Oil Surprisingly Fast

- Net oil imports dropping from 13 million b/d to less than 8 million b/d the latest 4-5 years



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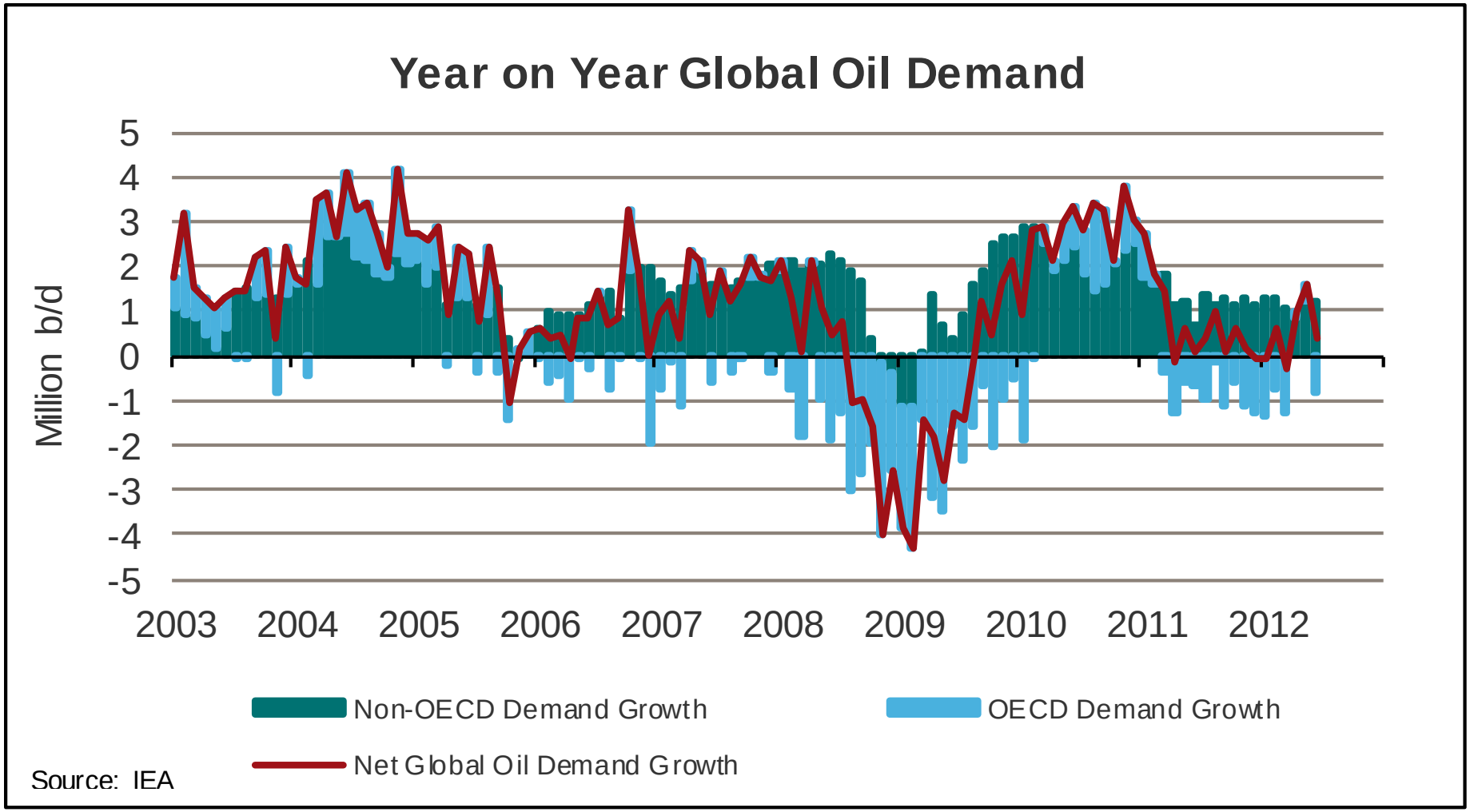
# Non-OECD Demand Still Holding – But Net Is Not Strong

- Weakness in OECD partly offsetting positive emerging markets demand growth

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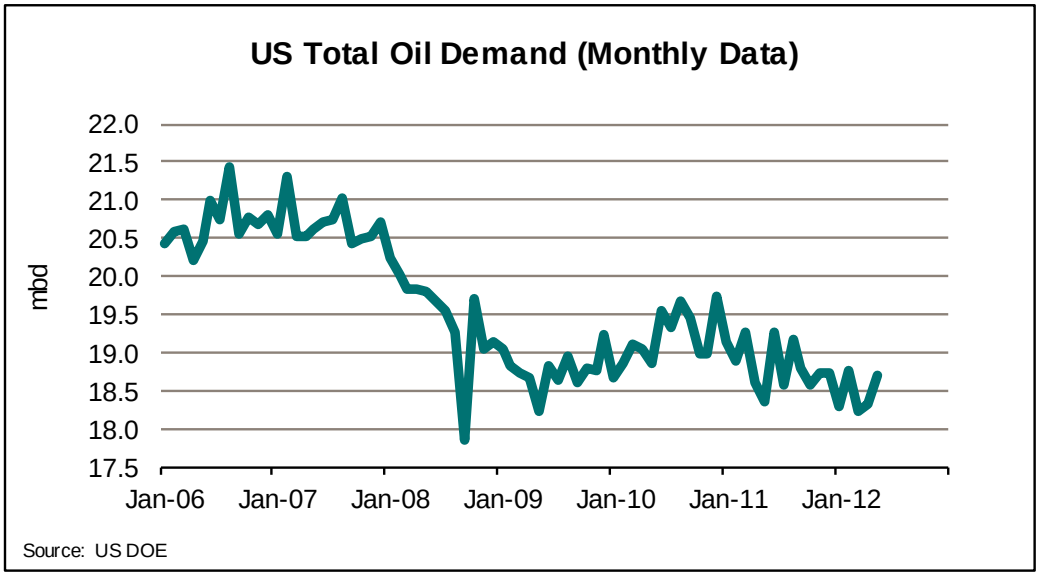
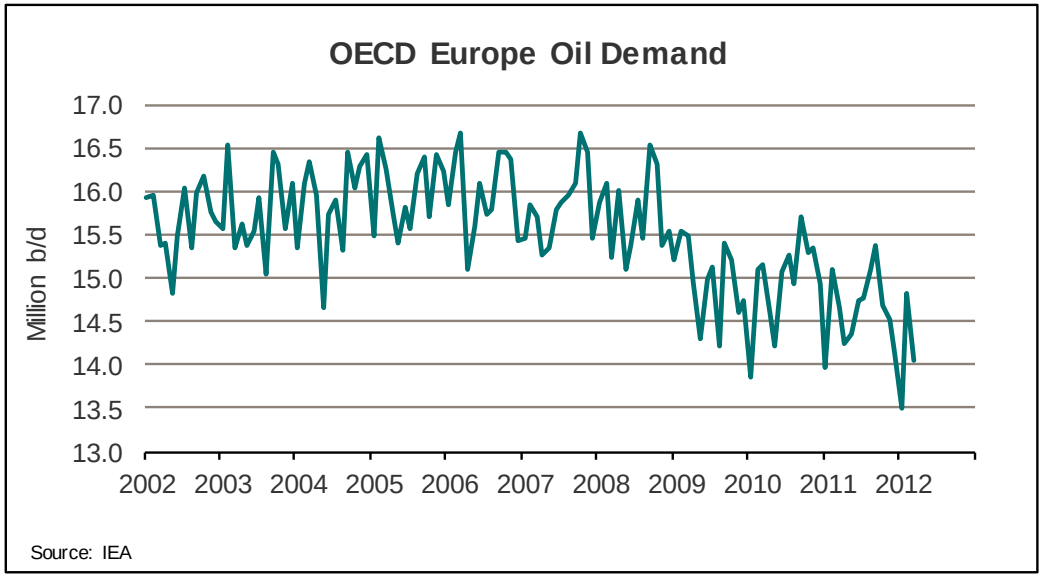
# Oil Demand Trending Lower In Both US & Europe

- Europe will struggle for a long time to create economic growth, while US is set up for efficiency gains and substitution







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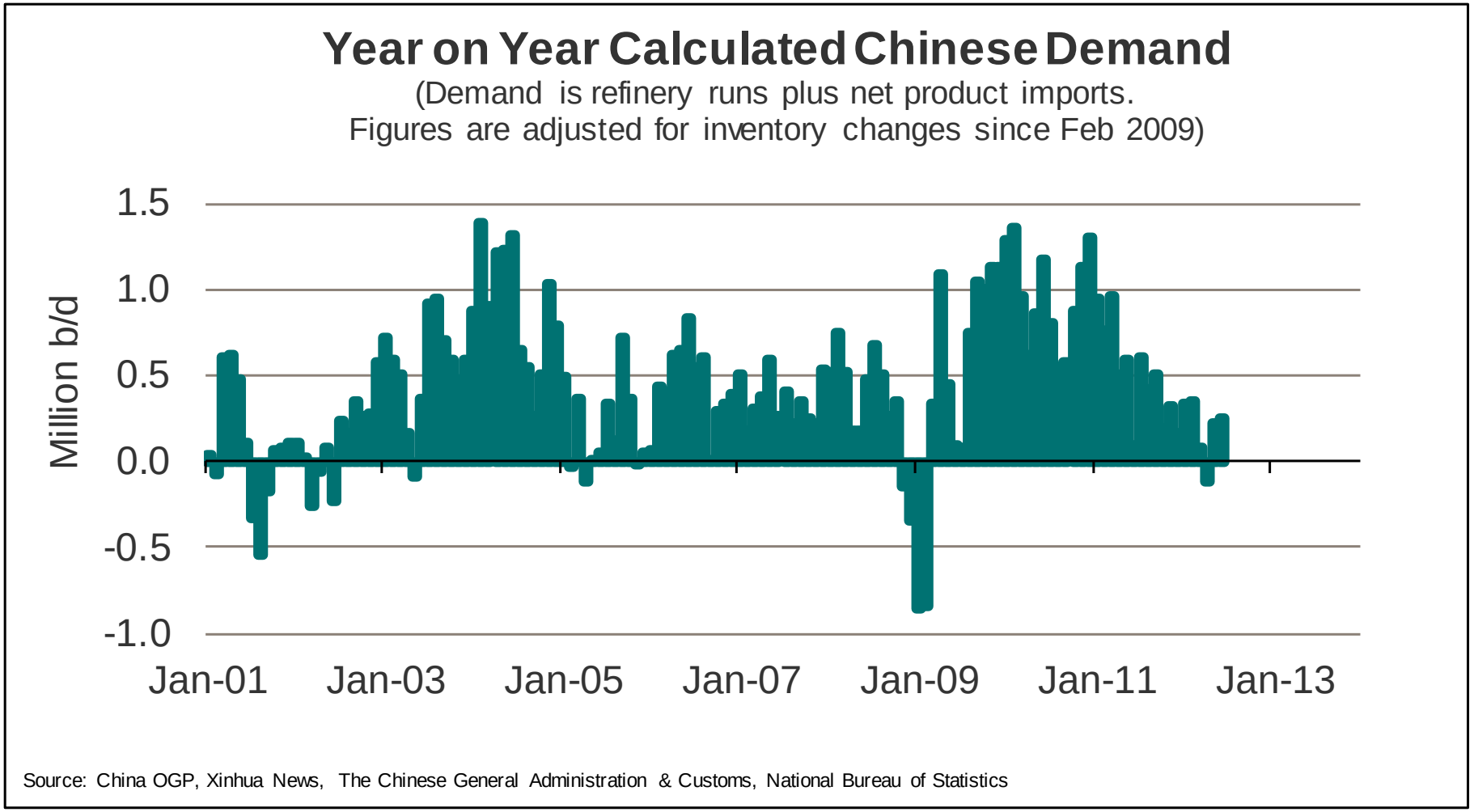
# Chinese Oil Demand Growth Is Weaker




Source: China OGP, Xinhua News, The Chinese General Administration & Customs, National Bureau of Statistics

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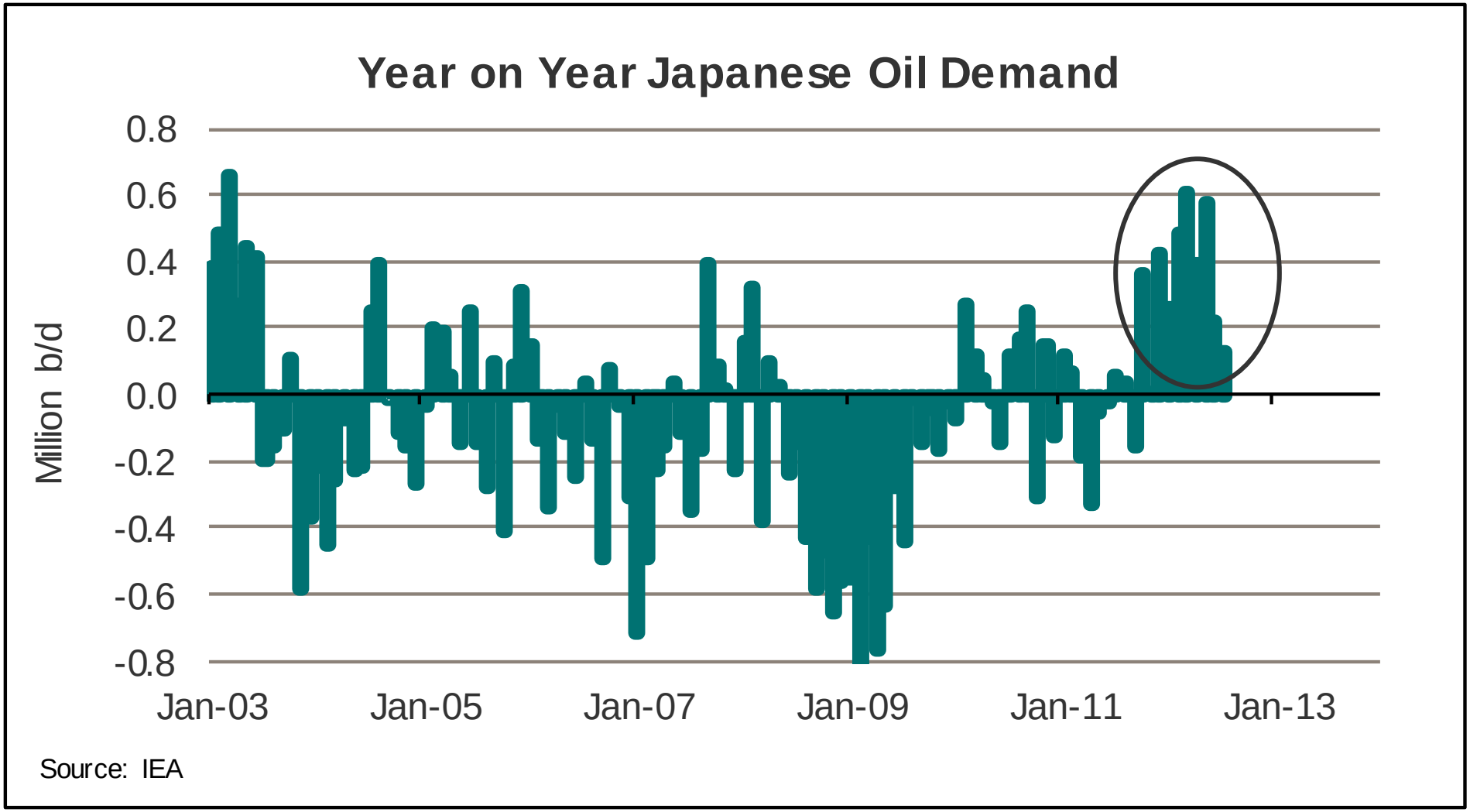
# Japanese Oil Demand Growth Very Strong - Quake In 2011

- Already weak demand growth in OECD is positively affected by oil for power usage in Japan – But this is not structural

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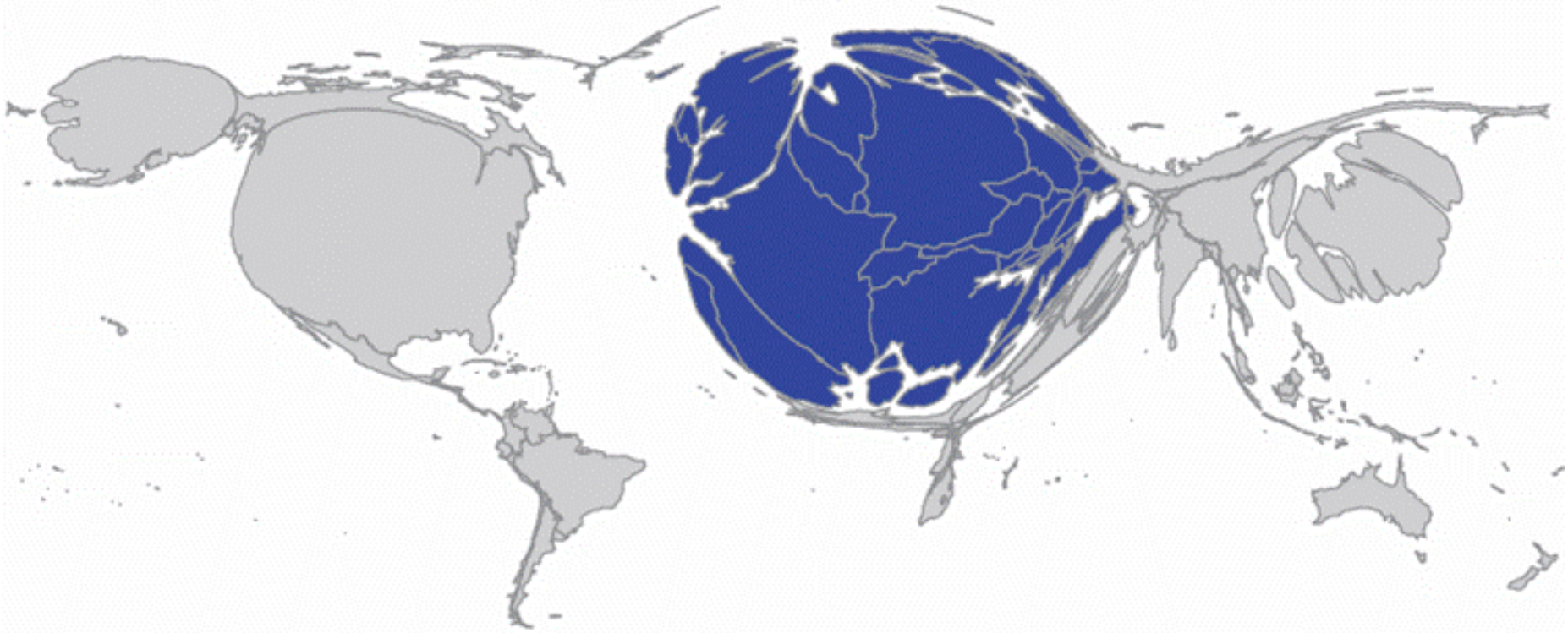
# Europe's Structural Problem Is Large Government Spending

- And to make it worse by 2060 one out of three Europeans will be above 65 years of age, so who's going to contribute??
- Living standards will be forced down as states are trying to reduce debt, wages are lowered and public benefits reduced

**Figure 16: Governments in Europe are big**
(the world resized by government spending in dollars, 2009)



Source: World Bank staff, based on IMF Government Financial Statistics.

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# US Fuel Efficiency Standards To Significantly Improve By 2025

-CAFE-standards to reach 49.6 MPG by 2025

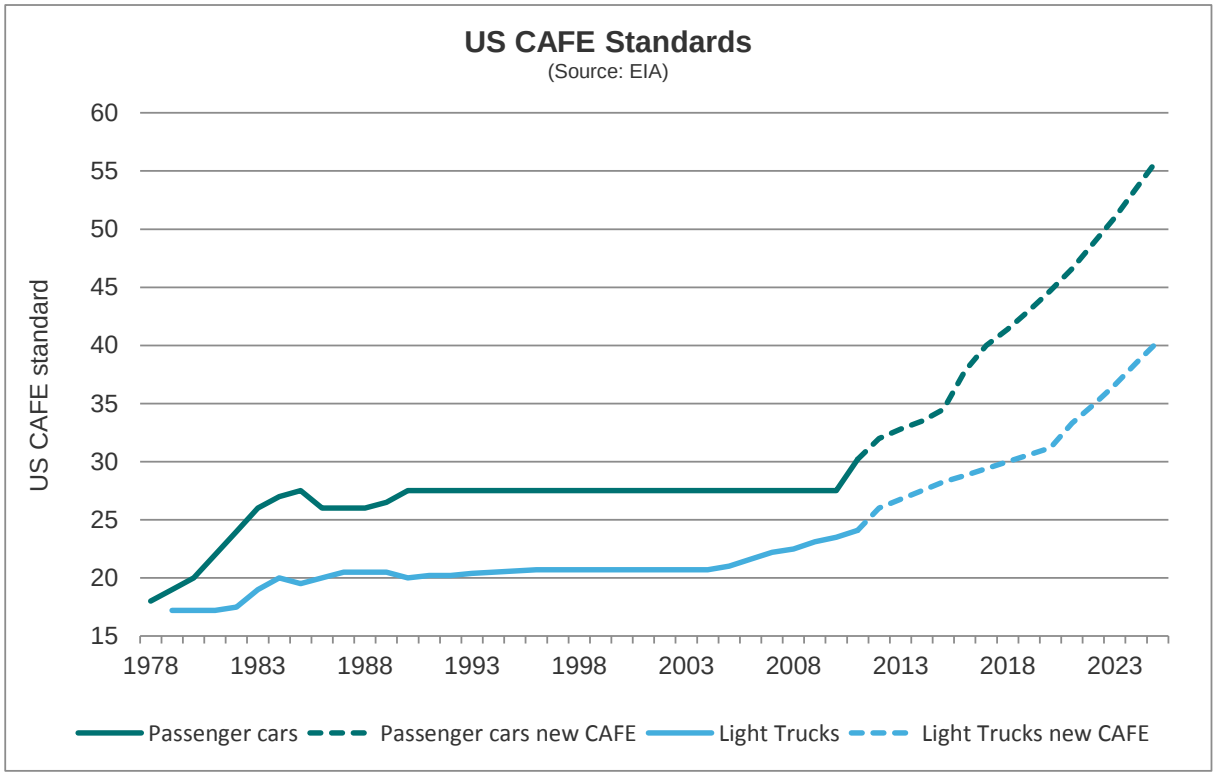
The formal proposal follows President Obama's agreement with 13 major automakers, announced in July, to gradually boost these vehicles' fuel economy to the equivalent of 54.5 miles per gallon -- up from the current standard of 27.3 mpg. Last year, the administration finalized rules to hike the standard to 35.5 mpg by 2016.

CAPTION By Brendan Smialowski, Getty Images

Source: Annual Energy Outlook – EIA June 27 2012

| | 2016 (base) | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Fuel economy only (miles per gallon)** | | | | | | | | | | |
| Passenger cars | 37.8 | 40.0 | 41.4 | 43.0 | 44.7 | 46.6 | 48.8 | 51.0 | 53.5 | 56.0 |
| Light-duty trucks | 28.8 | 29.4 | 30.0 | 30.6 | 31.2 | 33.3 | 34.9 | 36.6 | 38.5 | 40.3 |
| All light-duty vehicles | 34.1 | 35.3 | 36.4 | 37.5 | 38.8 | 40.9 | 42.9 | 45.0 | 47.3 | 49.6 |
| **Carbon dioxide emissions (grams per mile)** | | | | | | | | | | |
| Passenger cars | 225 | 213 | 202 | 192 | 182 | 173 | 165 | 158 | 151 | 144 |
| Light-duty trucks | 298 | 295 | 285 | 277 | 270 | 250 | 237 | 225 | 214 | 203 |
| All light-duty vehicles | 250 | 243 | 232 | 223 | 213 | 200 | 190 | 181 | 172 | 163 |

[a]Based on projected mix of LDV sales.

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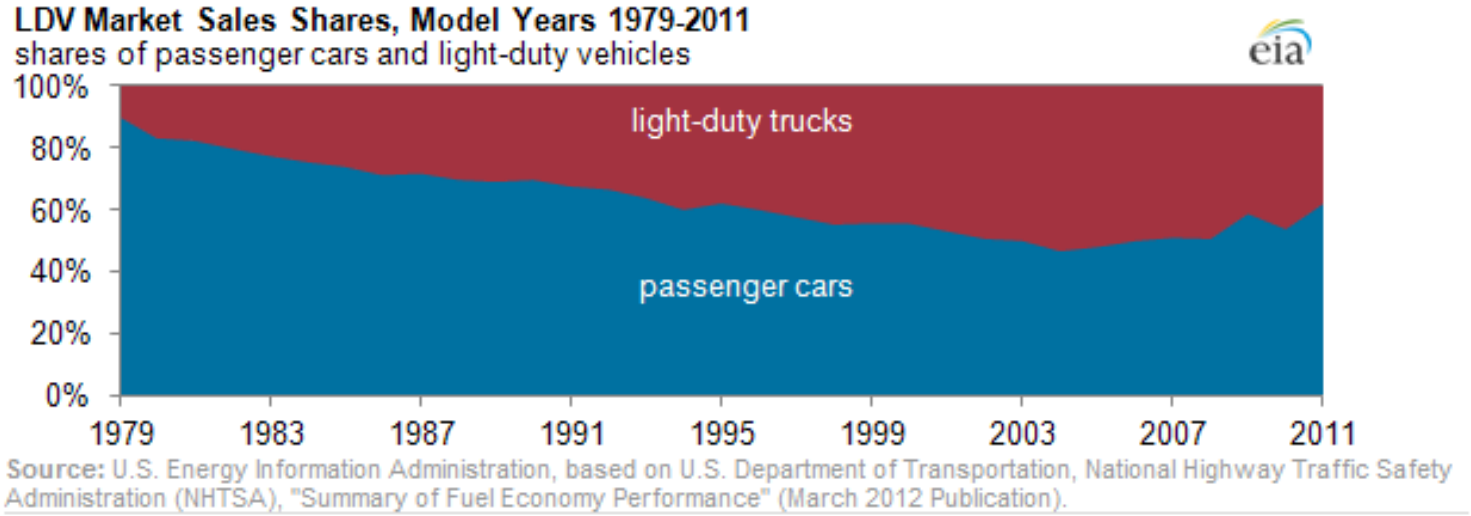
# The Key Is That SUVs Will Not Get Off The Hook This Time

- The light trucks market share is still large but has started to fall. SUVs will also be subject to stricter standards the coming years.




Source: U.S. Energy Information Administration, based on U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA), "Summary of Fuel Economy Performance" (March 2012 Publication).

| | |
|---|---|
| Number of regular cars in the US | 252 |
| Annualized new car sales in millions | 14 |
| Total million cars sold between 2012 to 2025 | 182 |
| New CAFE-cars share in 2025 assuming flat total size of fleet | 72 % |
| Replacement per year | 5.6% |
| Improved average efficiency from now to 2025 in MPG ((49.6-27)/2/27) | 42 % |
| Total average efficiency gain per year for the whole fleet | 2.3% |
| Gasoline demand in 2011 | 9.1 |
| Reduction in demand 2012-2025, based on 9.1 mbd*72%*42% | 2.8 |
| **Million b/d gasoline demand in 2025** | **6.3** |

*Real life MPG of the fleet is 22 MPG while the current CAFE standard is 27 MPG*

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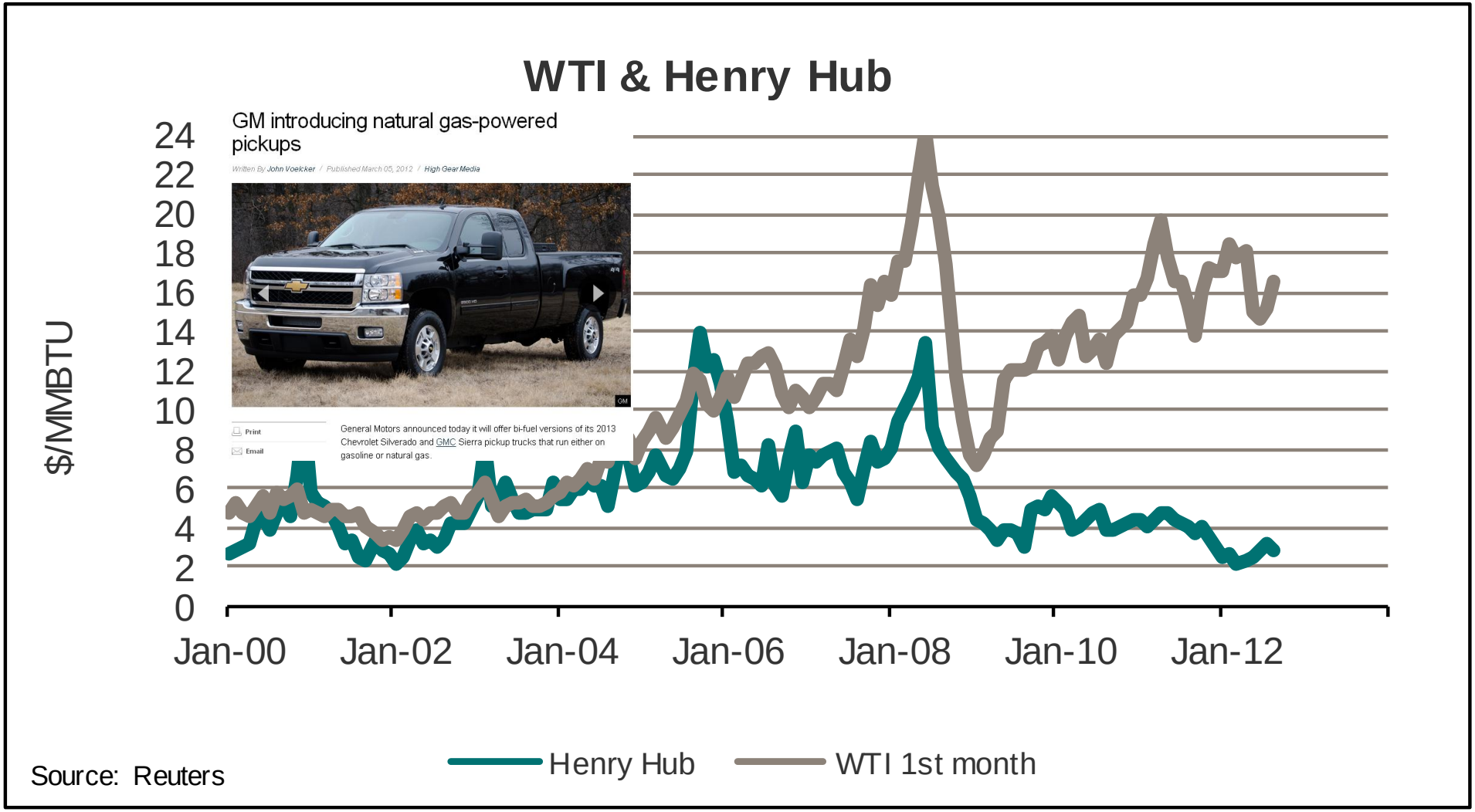
# The Huge US Oil-Gas Spread Provides Substitution Possibilities

-General Motors will soon produce dual fuel pick ups and trucks that can switch between gasoline and CNG




Source: Reuters

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# Only 1000 New LNG Stations Would Cover The 18 Wheelers

- Hence it will provide an even larger effect in the medium term to replace diesel with natural gas (3.5 million b/d)


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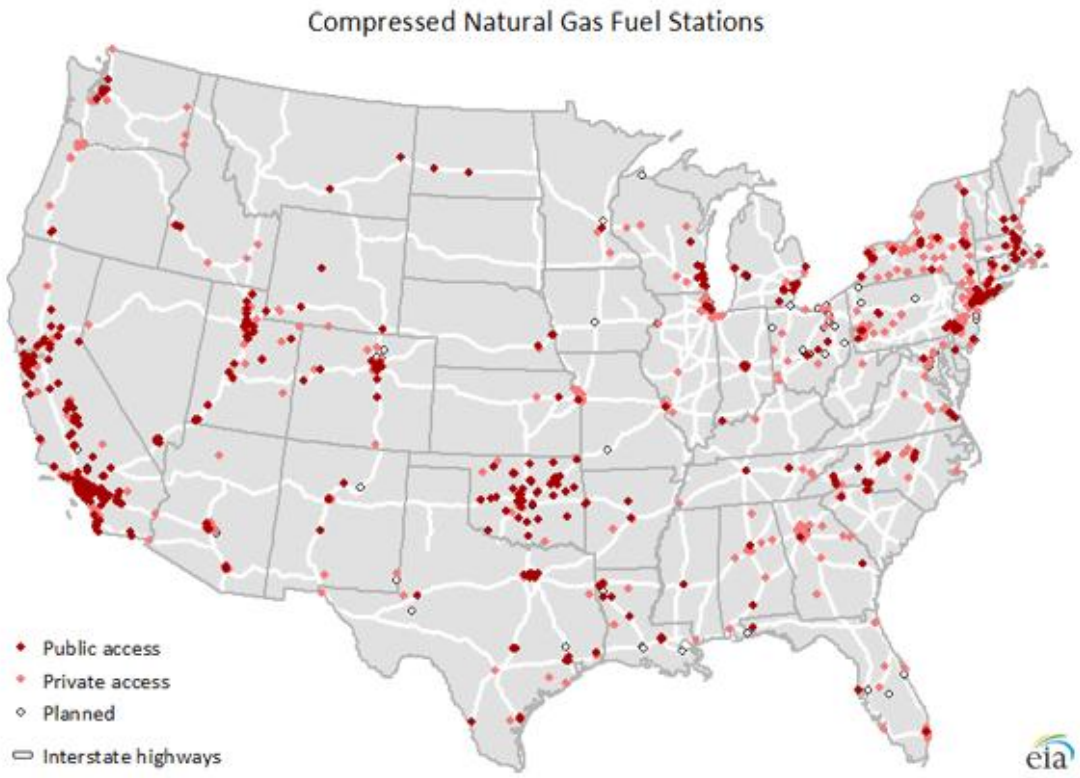
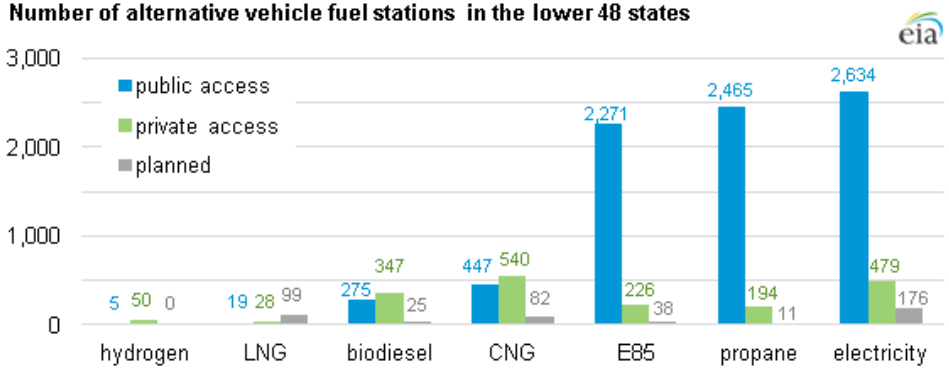
# Only About 1000 Filling Stations For CNG In The US

-More than 160.000 stations for gasoline





Chesapeake and GE to deploy GE's «CNG in a Box» fueling systems across the US through Chesapeake's affiliate Peake Fuel Solutions. Compresses natural gas from a pipeline and compress it on site. Units in two configurations: 8 foot * 20 foot and 8 foot * 40 foot.
A CNG vehicle can then refill using a traditional fuel dispenser.

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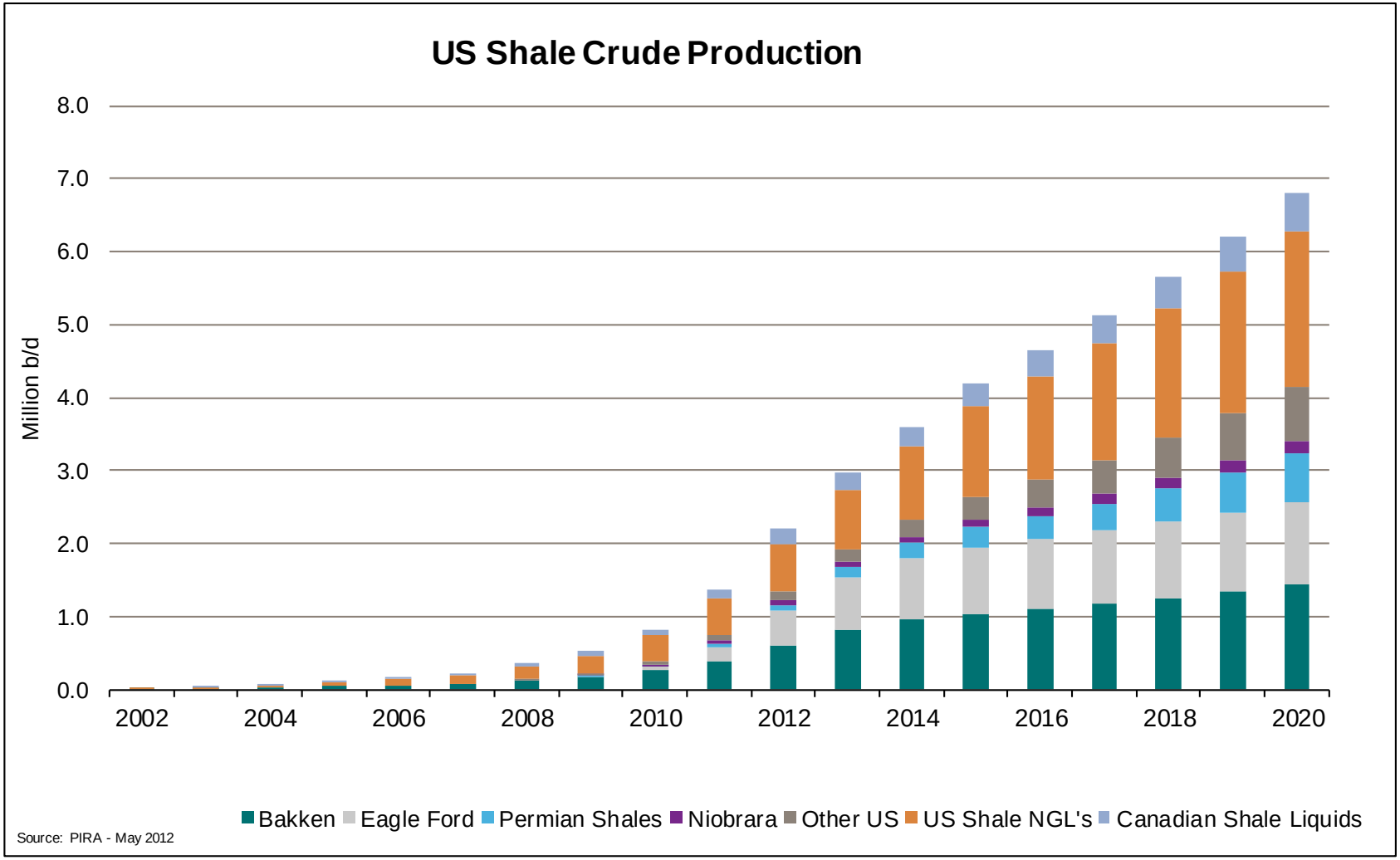
# North American Shale Oil Production Growing Very Quickly

- NGL's could also affect the crude balance going forward as the current US crude-natgas spread justifies investing in GTL-plants

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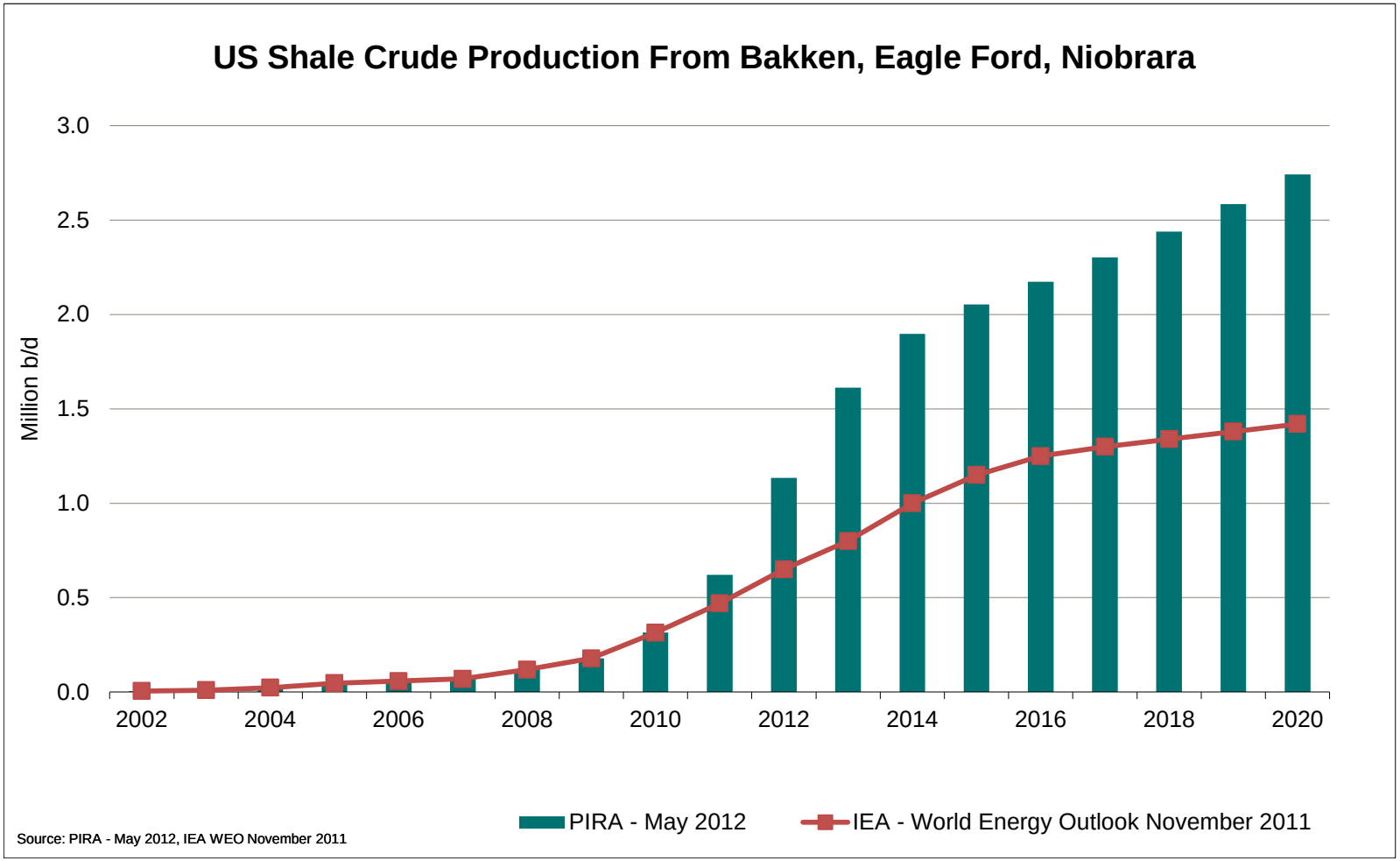
# IEA's Shale Oil Estimates In WEO Nov 2011 Are Far Too Low

- Note that only half a year after the IEA shale liquids estimates were published it was already way off the reality

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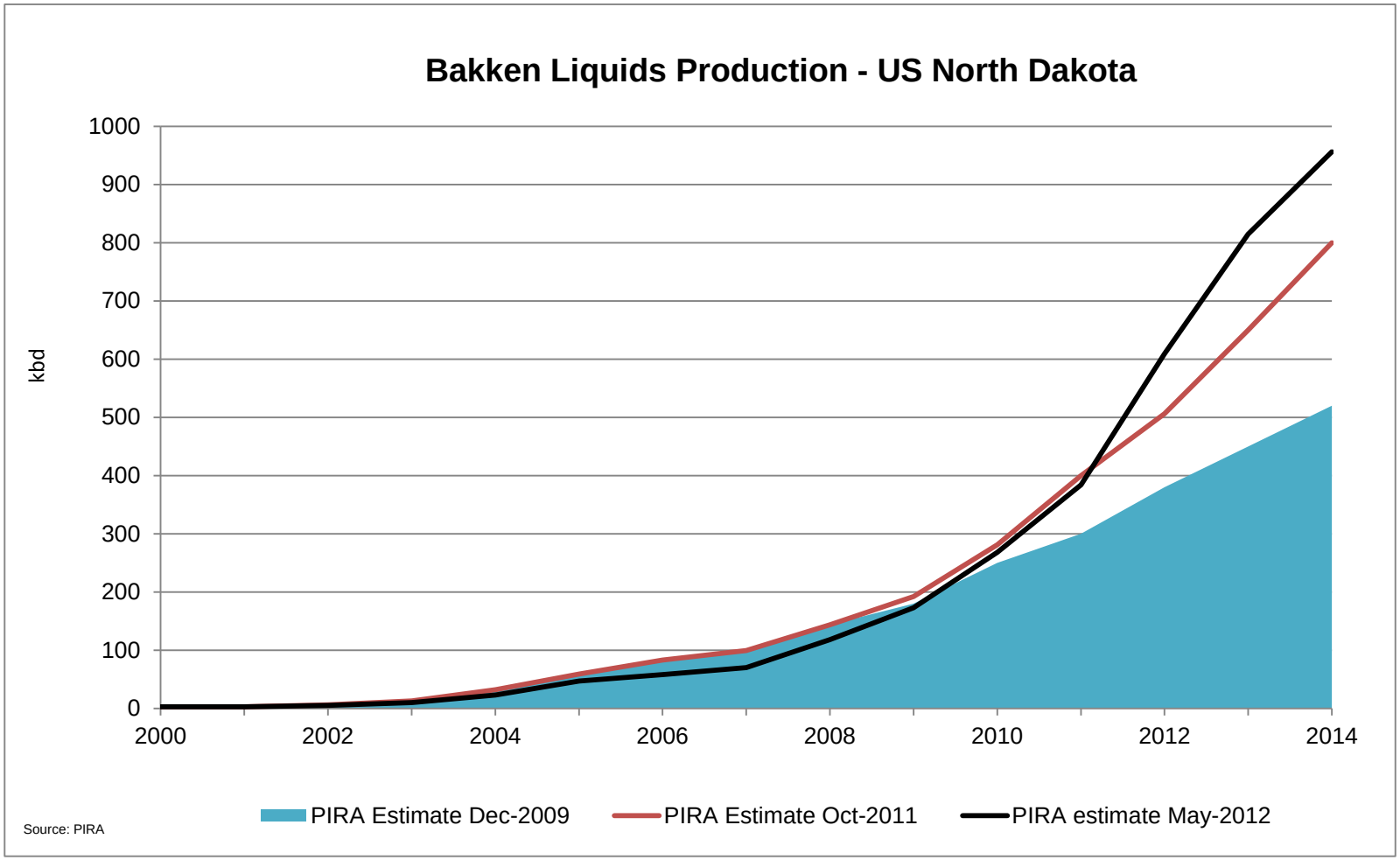
# Production Forecasts Constantly Hiked Higher For Every Update

- Bakken shale crude forecast already approximately doubled for 2014

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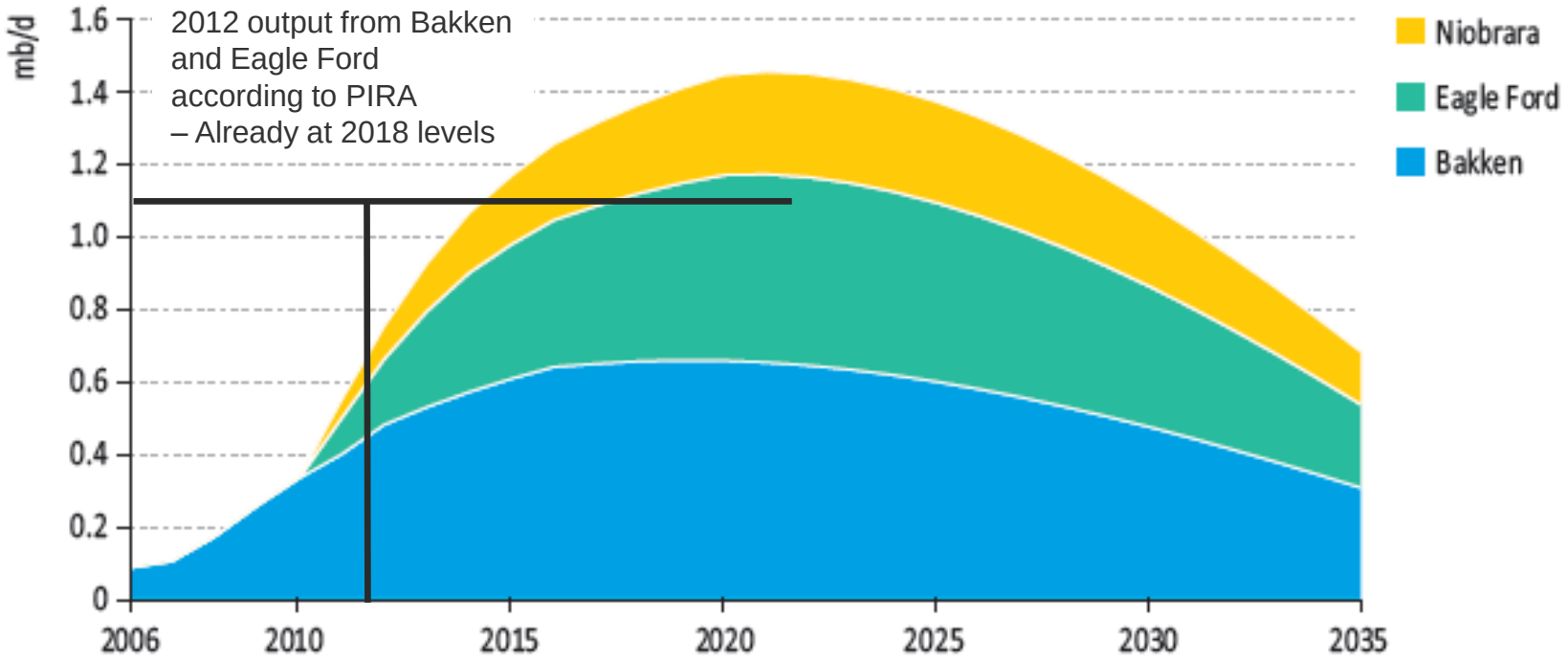
# IEA's Shale Oil Estimates In WEO Nov 2011 Are Far Too Low

(Source: IEA WEO November 2011, page 129)

**Figure 3.18 • Light tight oil production potential from selected plays**

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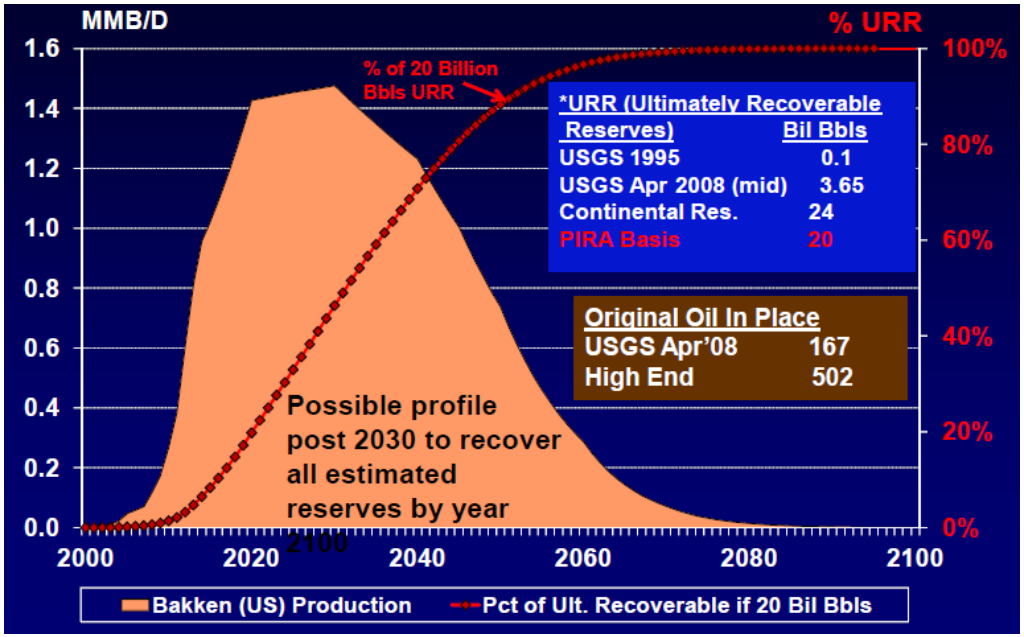
# How Large Are The US Shale Oil Resources?

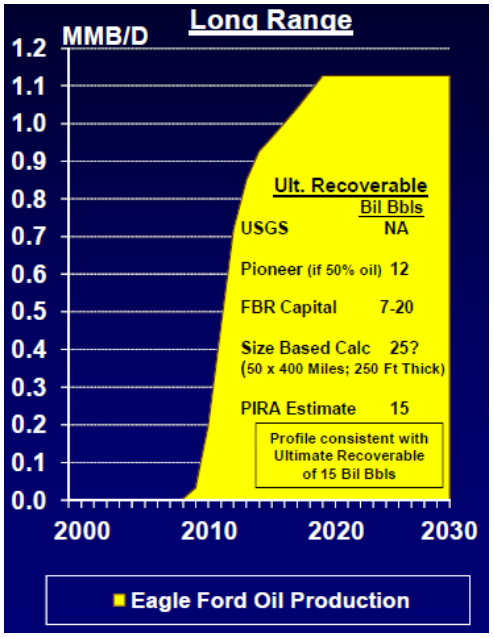
(Source: PIRA/USGS/Continental Res./Pioneer/FBR Capital, EIA)

**Table ii U.S. Technically Recoverable Shale Oil Resources Summary**

| Play | Technically Recoverable Resource | | Area (sq. miles) | | Average EUR | |
|---|---|---|---|---|---|---|
| | Gas (Tcf) | Oil (BBO) | Leased | Unleased | Gas (Bcf/ well) | Oil (MBO/ well) |
| Eagle Ford | … | 3.35 | 3,323 | | … | 300 |
| **Total Gulf Coast** | **…** | **3.35** | **3,323** | | **…** | **300** |
| Avalon & Bone Springs | … | 1.58 | 1,313 | | … | 300 |
| **Total Southwest** | **…** | **1.58** | **1,313** | | **…** | **300** |
| Bakken | … | 3.59 | 6,522 | | … | 550 |
| **Total Rocky Mountain** | **…** | **3.59** | **6,522** | | **…** | **550** |
| Monterey/Santos | … | 15.42 | 1,752 | | … | 550 |
| **Total West Coast** | **…** | **15.42** | **1,752** | | **…** | **550** |
| **Total Lower 48 U.S.** | **…** | **23.94** | **12,910** | | **…** | **460** |


1. Department of Energy, Energy Information Administration. *Annual Energy Outlook 2010.* April 2010.
2. Department of Energy, Energy Information Administration. Modified by INTEK Inc.
3. Congressional Research Services. *Unconventional Gas Shales: Development, Technology, and Policy Issues.* October 2009.
4. NRG & Associates and HPDI Data.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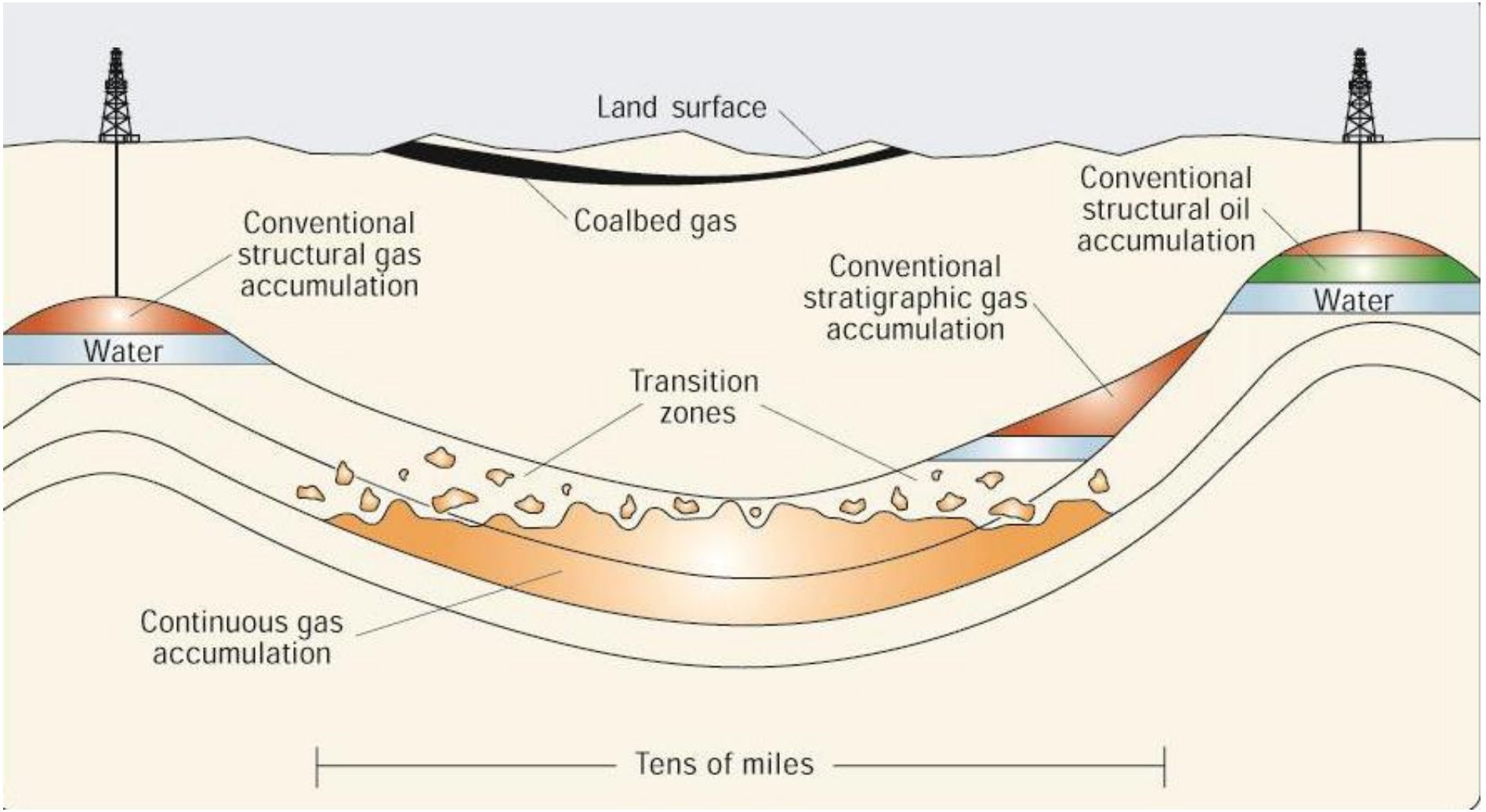
# Conventional vs Unconventional

- Moving to the “kitchen” instead of the “living room” (Source: USGS)

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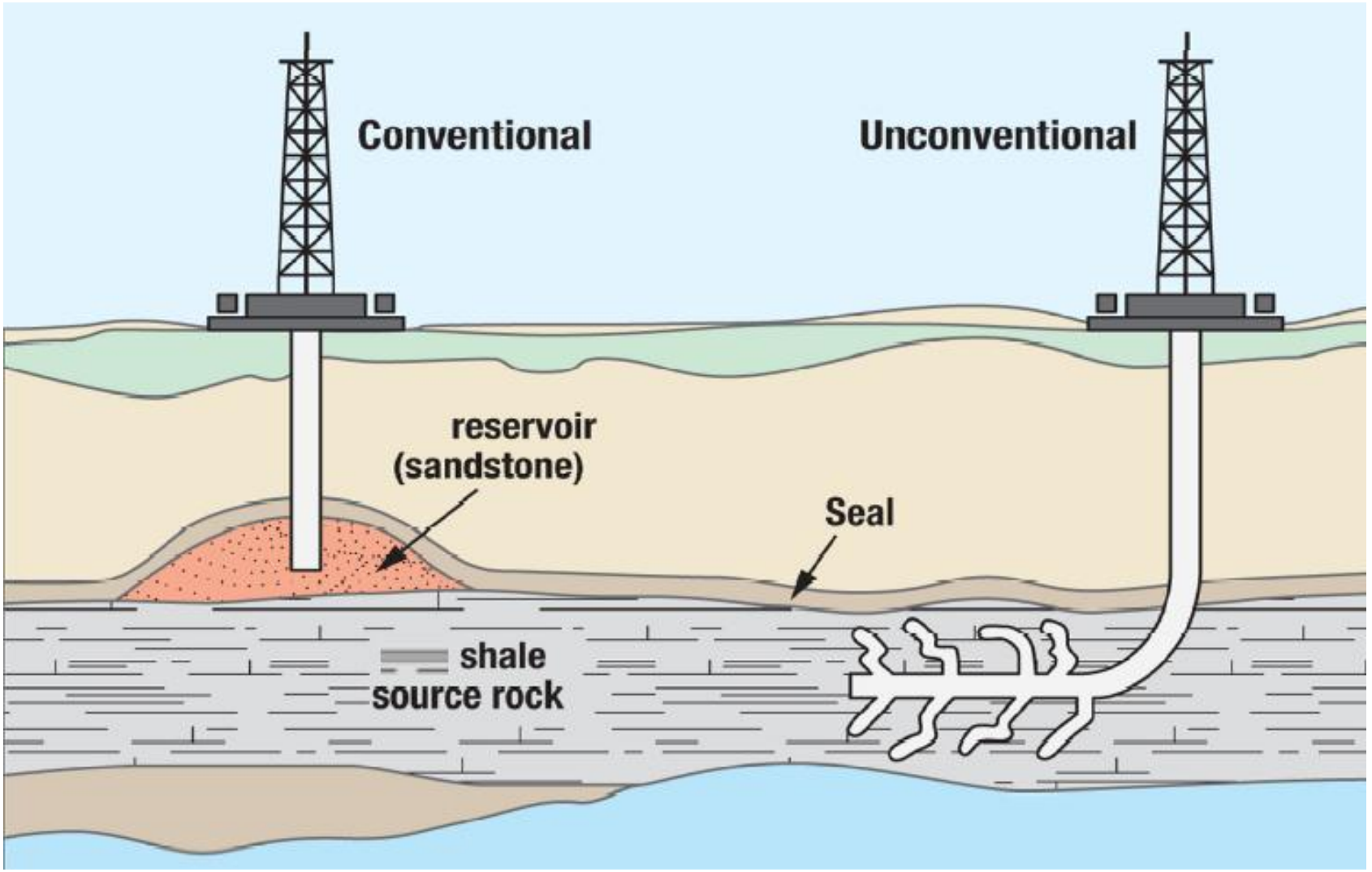
# Technology Has Unlocked Gas & Oil In Shale Source Rock



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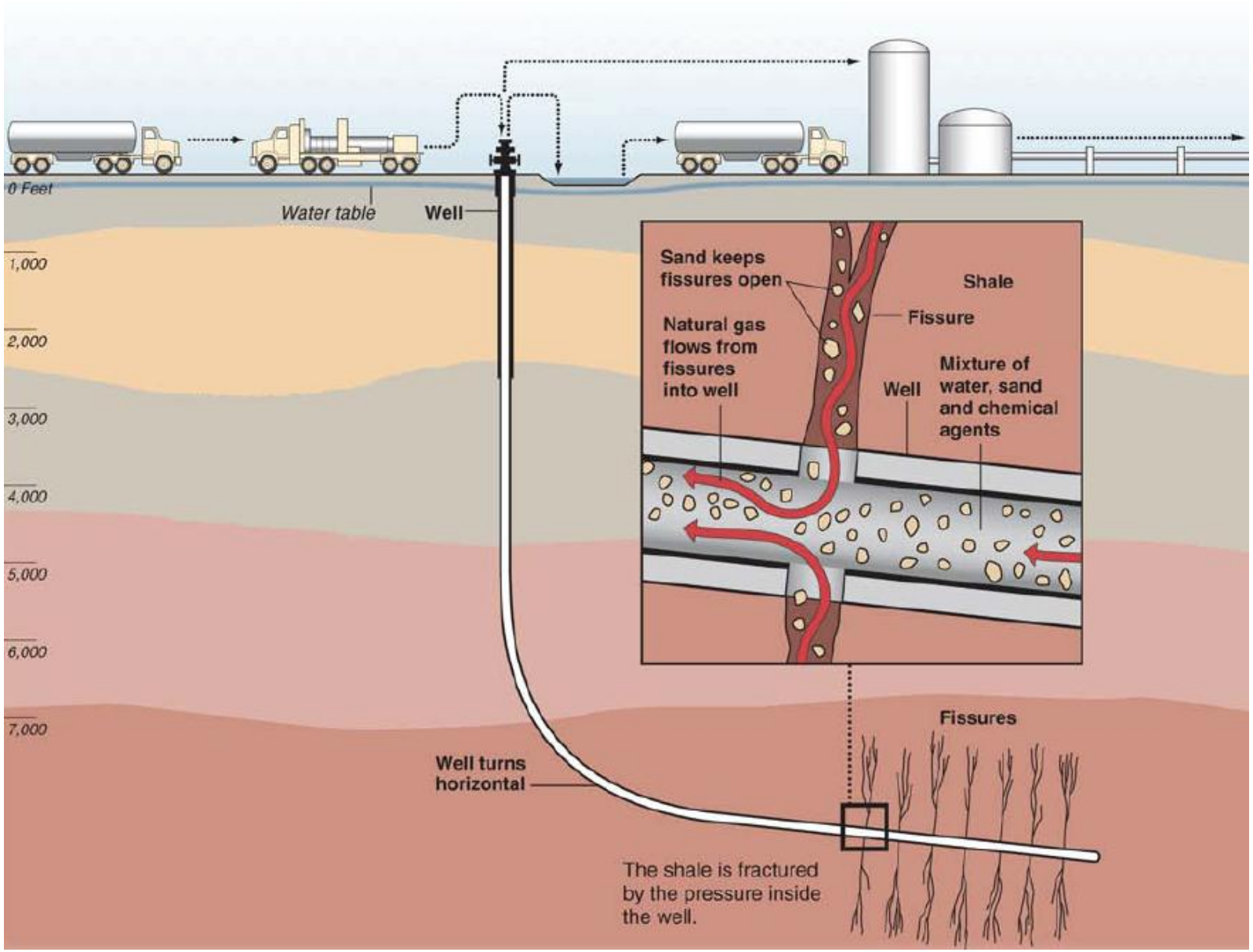
# The Hydraulic Fracturing Technique



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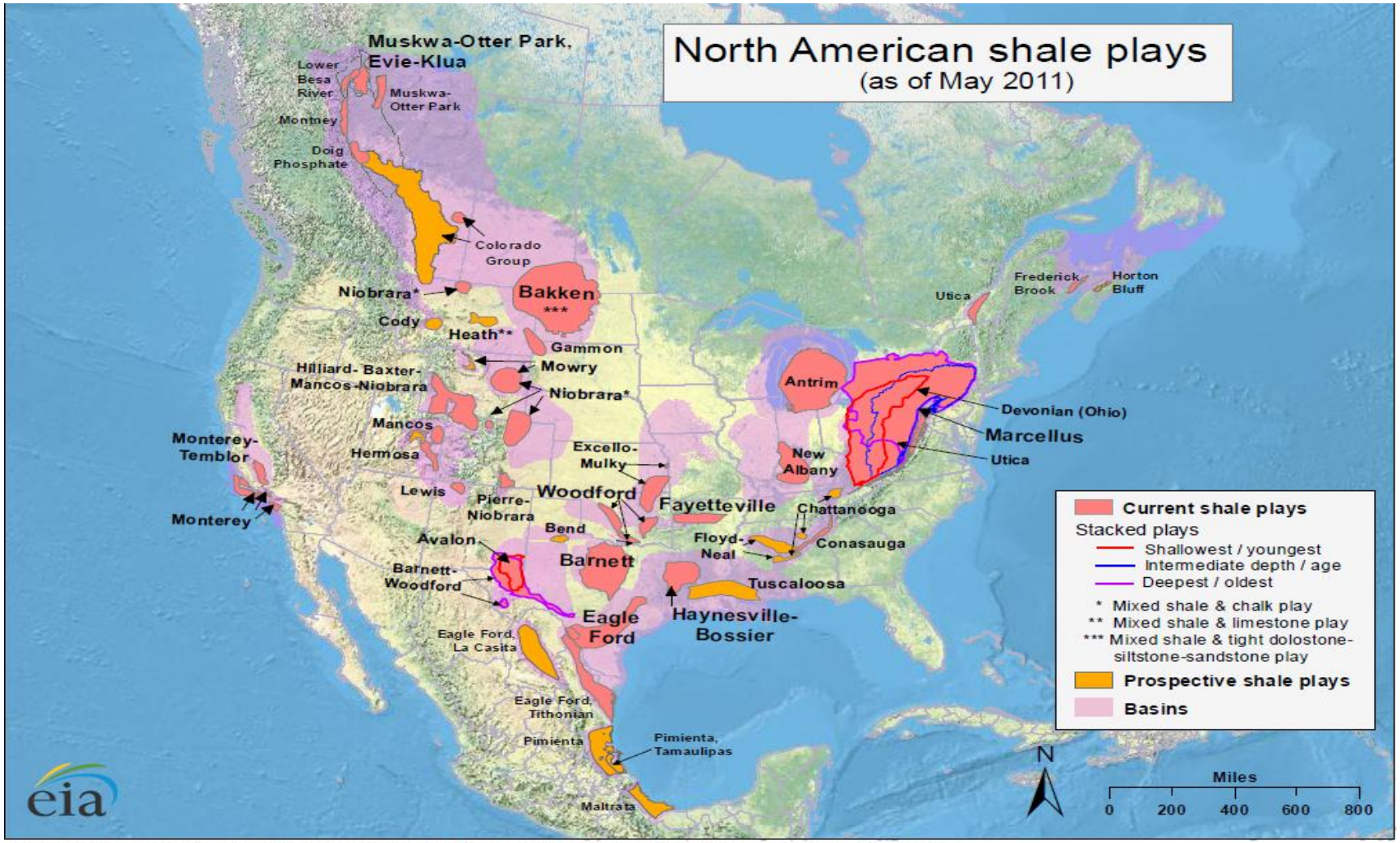
# North American Shale Oil Plays




Source: U.S. Energy Information Administration based on data from various published studies. Canada and Mexico plays from ARI.
Updated: May 9, 2011

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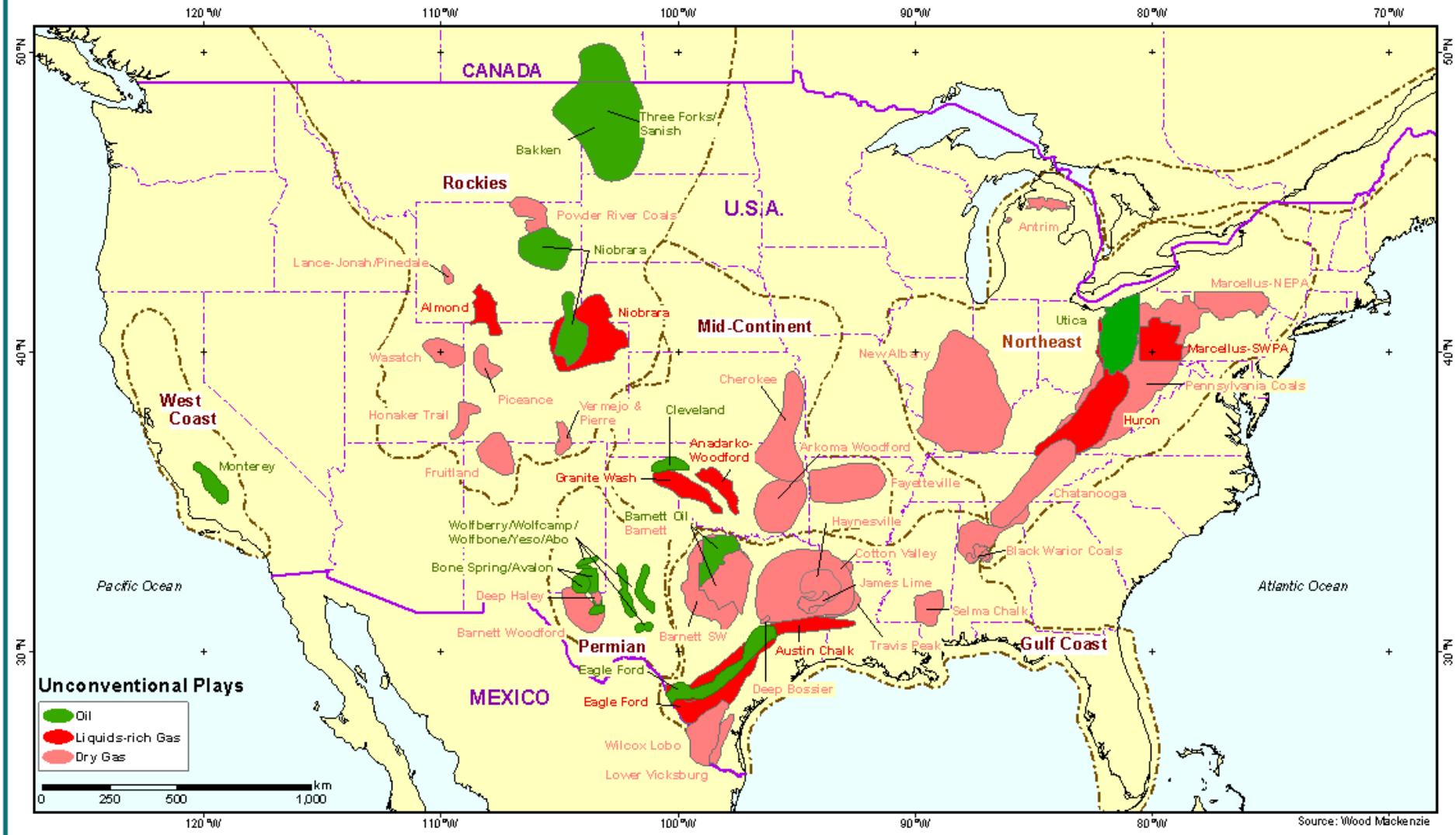
# Unconventional Oil Plays In The US

-Source: WoodMac, April 2012







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# What Is Shale Crude?

- **Shale crude / shale oil is oil contained in shale rock**
  - Shale oil has properties like conventionally produced oil
    - Generally high API gravity and low sulfur (Similar to WTI crude)
    - Produced via horizontal drilling and fracturing the rock to open up pathways for oil to flow
  - Shale oil is thermally matured kerogen
    - "Oil Shale" is immature kerogen (Abundant in western U.S.)
  - **"Shale crude" term includes condensate & "Tight Oil"**
    - Condensate is very light oil with API gravity higher than WTI
    - Tight oil is oil in low permeability rocks other than shale
      - Tight oil needs horizontal drilling / fracking to be economic

- Kerogen is formed from organic matter deposited into sedimentary basins.
- Kerogen is a very high molecular weight solid hydrocarbon that is non-extractable using organic solvents.
- As more sediment is formed above, the kerogen becomes deeper beneath the earth's surface and its temperature rises.
- The rising temperature transforms the kerogen into oil and gas.
- Some oil & gas remains in shale rock or other tight sands; some migrates up thru more permeable rocks to "traps" where it can be produced by conventional means.
- Natural Gas Liquids (NGL) also are contained in shale rock and are first produced as Shale gas and are subsequently separated in gas plants into dry gas and NGL.


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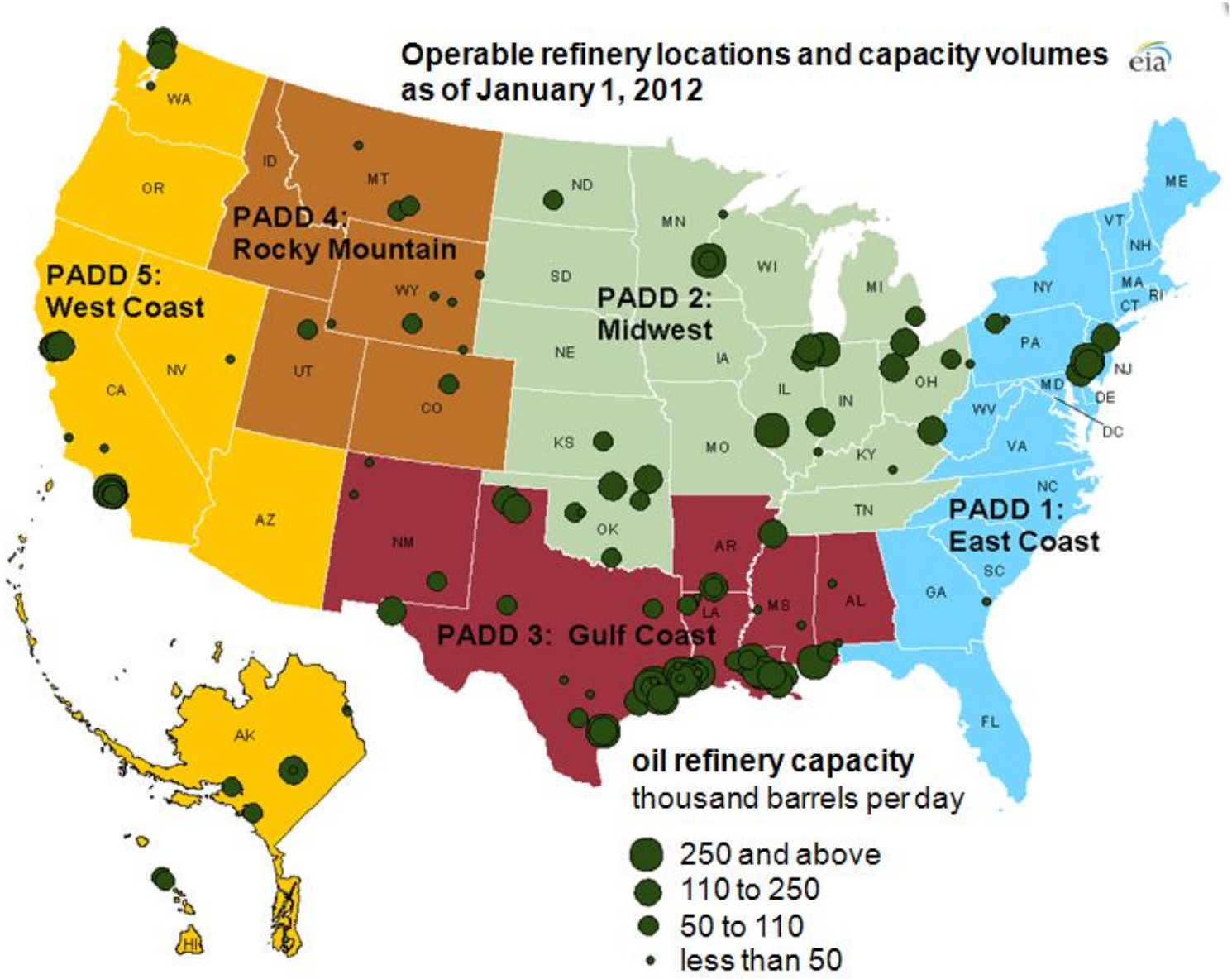
# US Oil Refineries – Centered On The Gulf Coast

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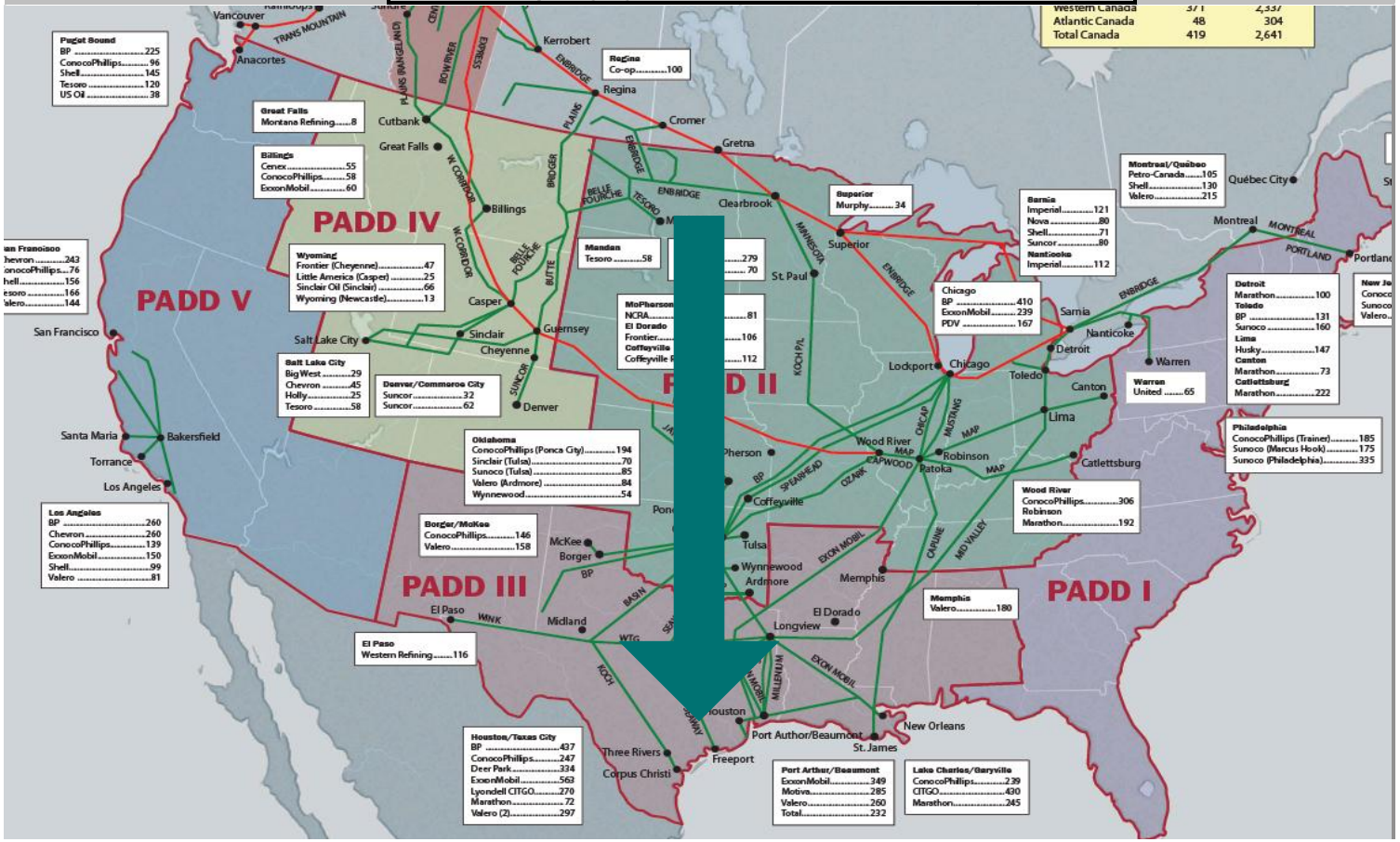
# So Far Lack Of Take-Away Capacity (US Pipelines)

- But this will change during the next three years

**Proposed Take-Away Pipelines**

| Projects | From/To | Owner/Operator | Quantity kbd | Proposed Completion |
|---|---|---|---|---|
| Keystone - Cushing to US GOM | Cushing/Nederland | TransCanada | 900 | 4Q-2013 |
| Seaway Reversal plus expansion | Cushing/Freeport | ConocoPhillips/Entreprise | 850 | 2Q-2012, 2Q-2013, 3Q 2014 |
| Keystone XL - Alberta to Cushing | Hardisty, ALB/Steele city, NE/Cushing | TransCanada | 900 | 4Q-2014 |
| Flanagan South | Flanagan, IL/Cushing | Enbridge | 400 | End 2014 |
| Not directly from Cushing but increase WTI to US GOM: | | | | |
| Longhorn WTI line reversal and expansion | El Paso/Midland/Houston | Magellan | 220 | 1Q-2013, 3Q 2013 |
| | **Total new capacity by end 2014:** | | **3270** | |



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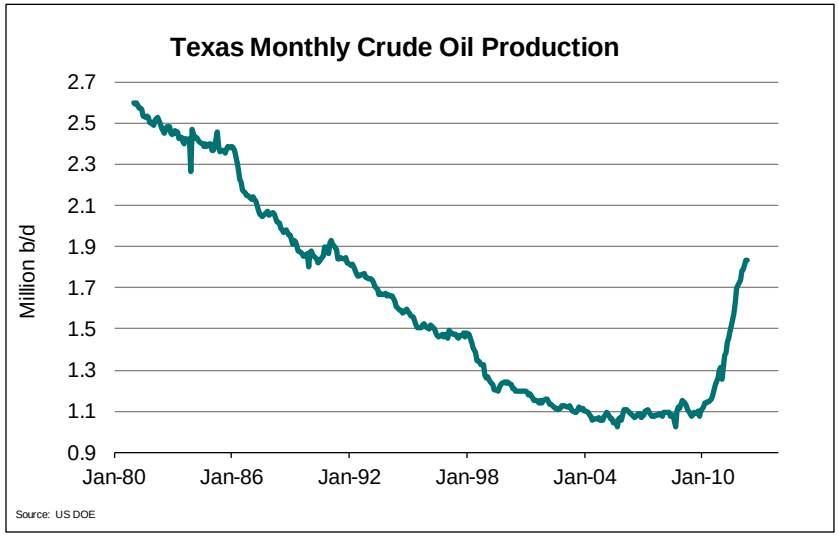
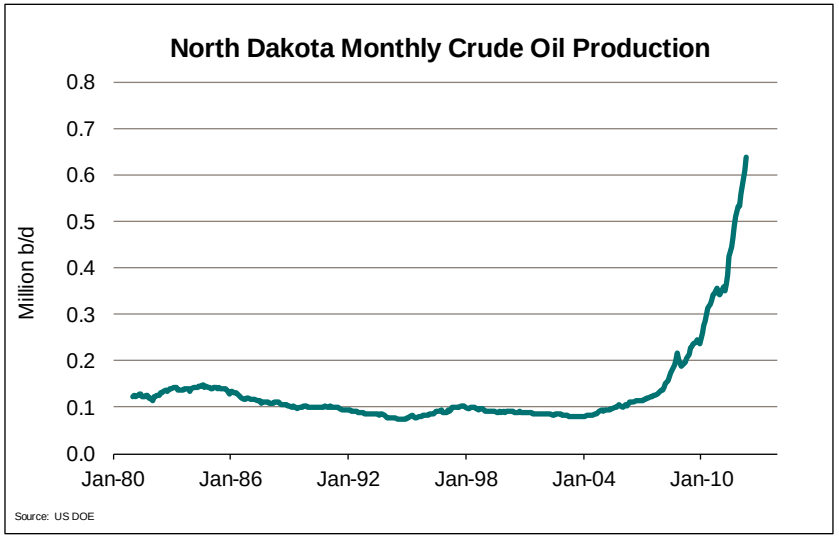
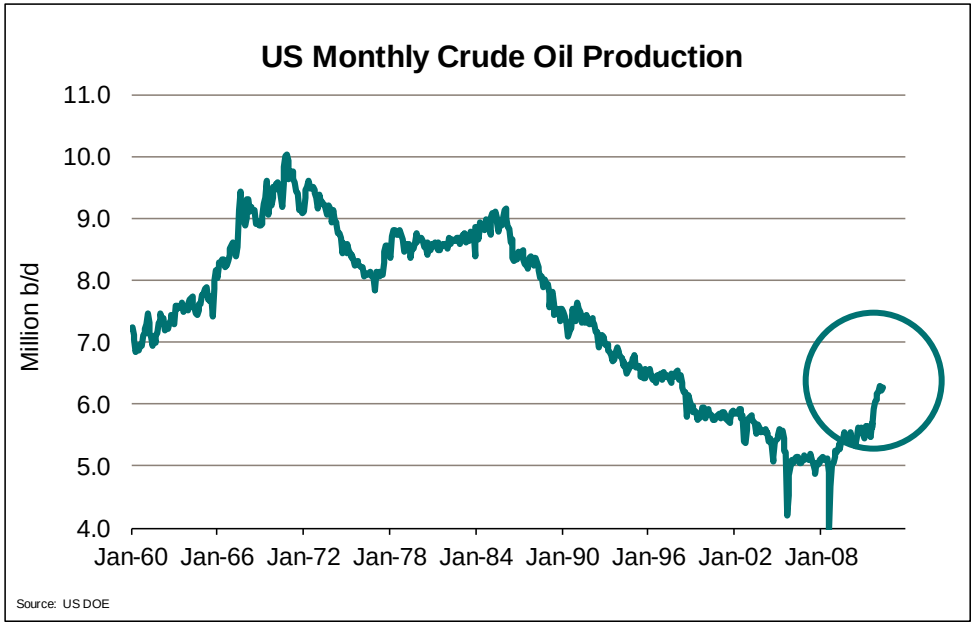
# US Crude Production Is Growing Quickly

- Key contributor is shale oil (mainly Bakken and Eagle Ford)



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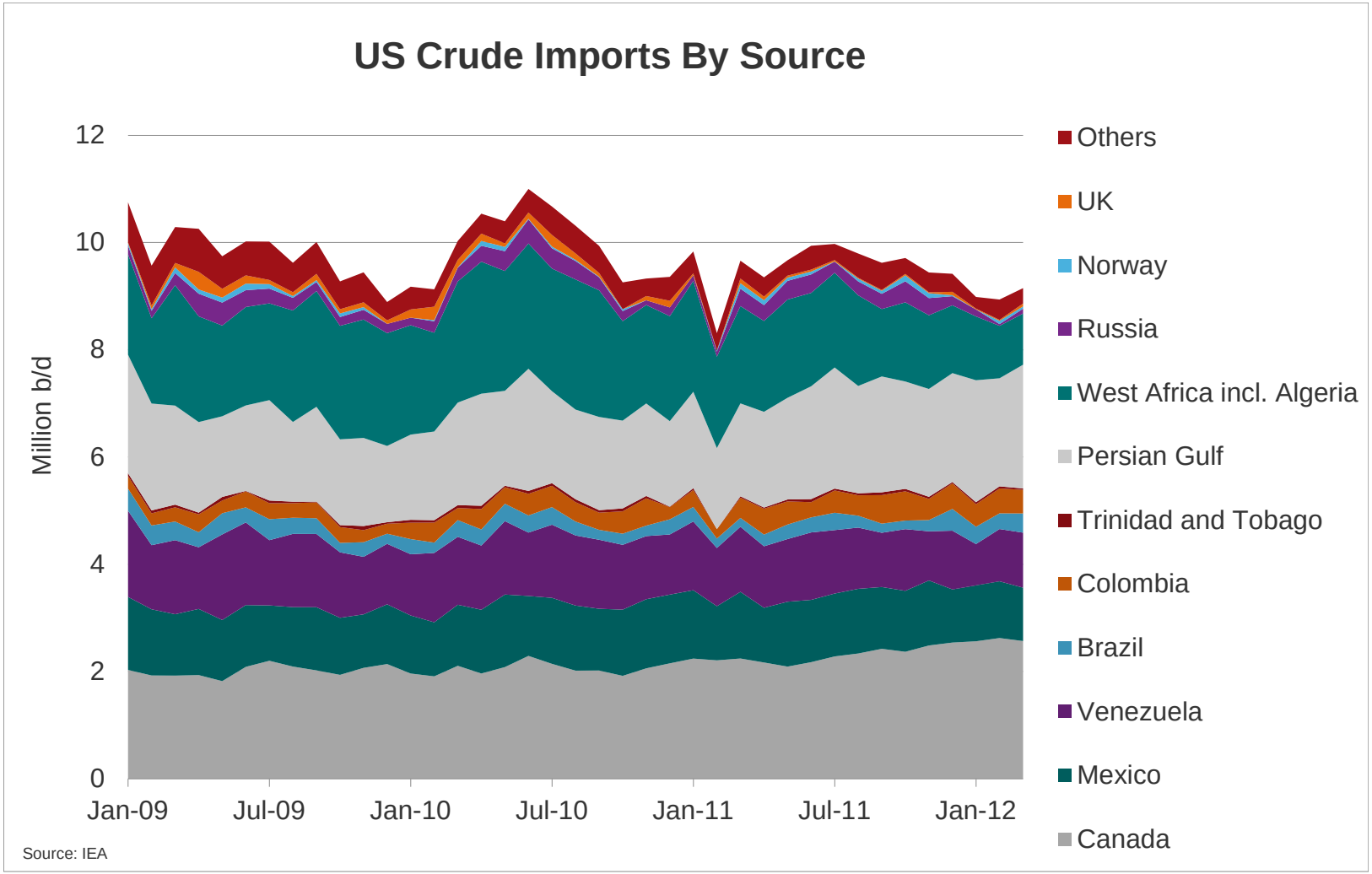
# US Will Push Away Imports From AG & West Africa First

- The top half of the sources below will disappear first from US crude imports. Canada set to continue to grow, others to drop.




Source: IEA

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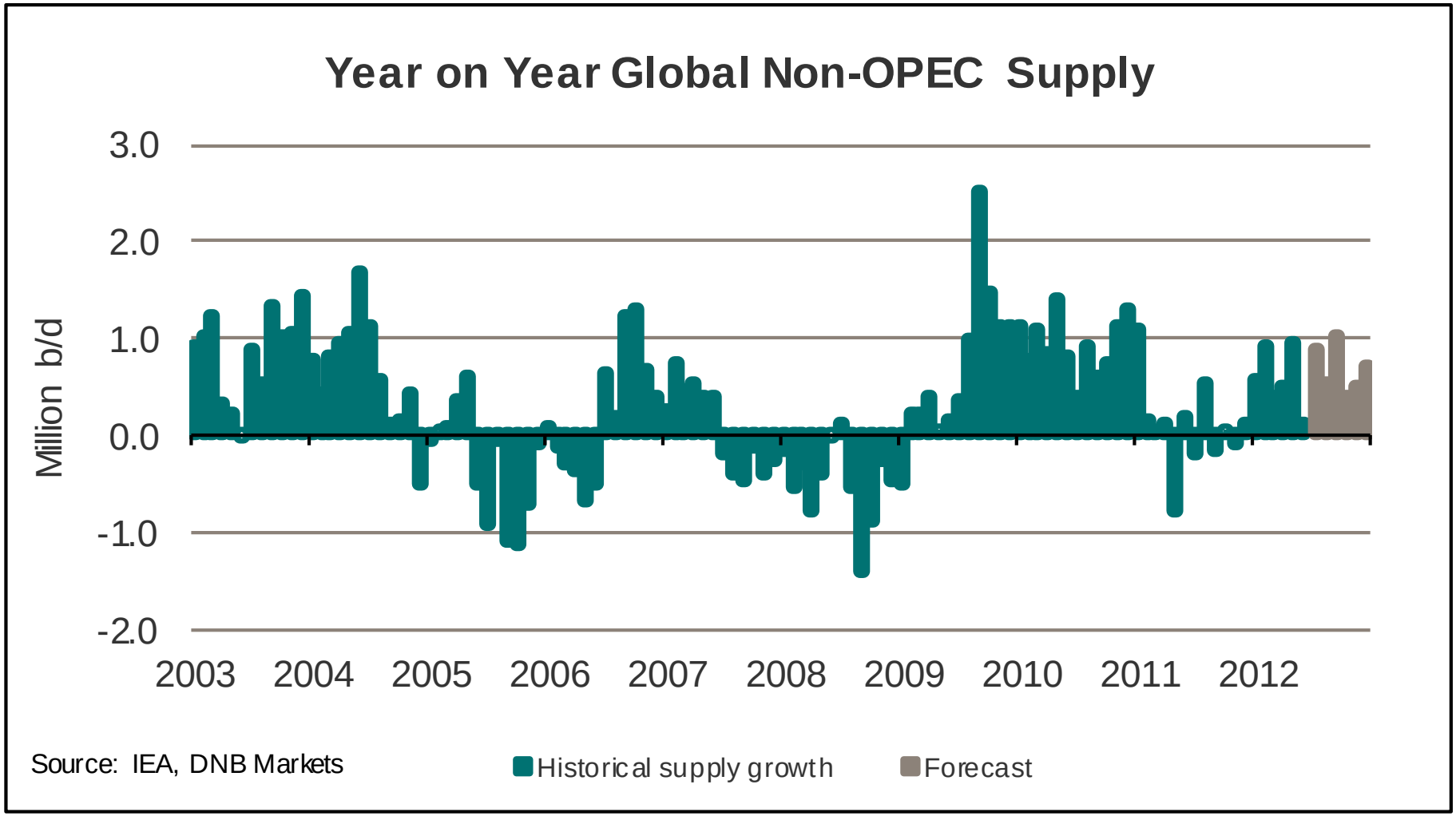
# Non-OPEC Starting To Deliver Better Growth Ahead?

-High oil prices are contributing to the fresh growth in non-OPEC supplies. We think the growth will continue to improve.







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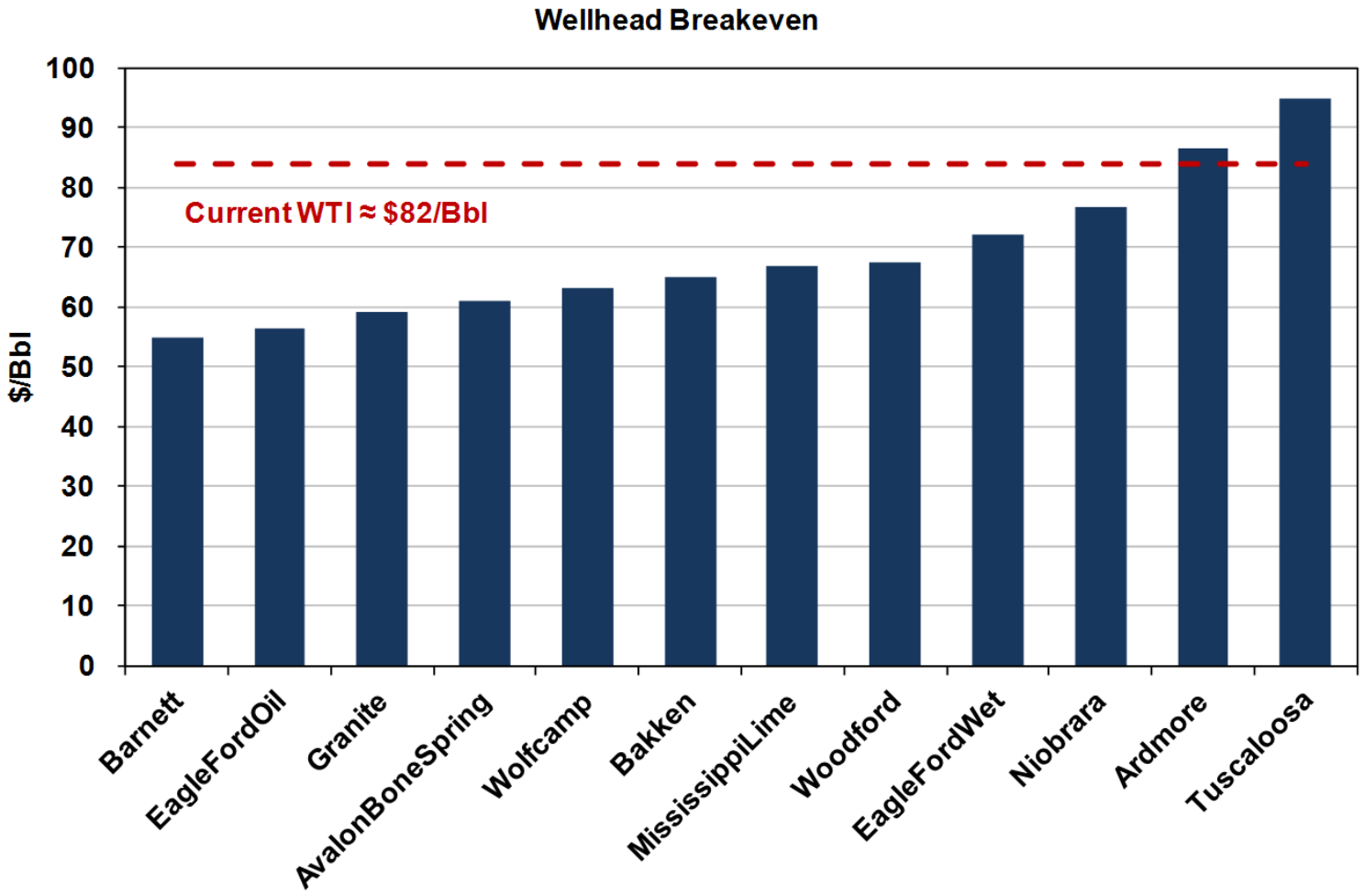
# Current Break Even For US Shale Liquids Mainly From 55-75 $/b

- Some projects set to be shelved if WTI fall below 80 $/b – Provides fundamental downside support




- *10% Discount Rate*
- *Gas Price = $4/MMBtu*
- *NGL Price = $30/Bbl*
- *Opex = $10/Bbl*
- *Royalties = 20%*

Source: PIRA

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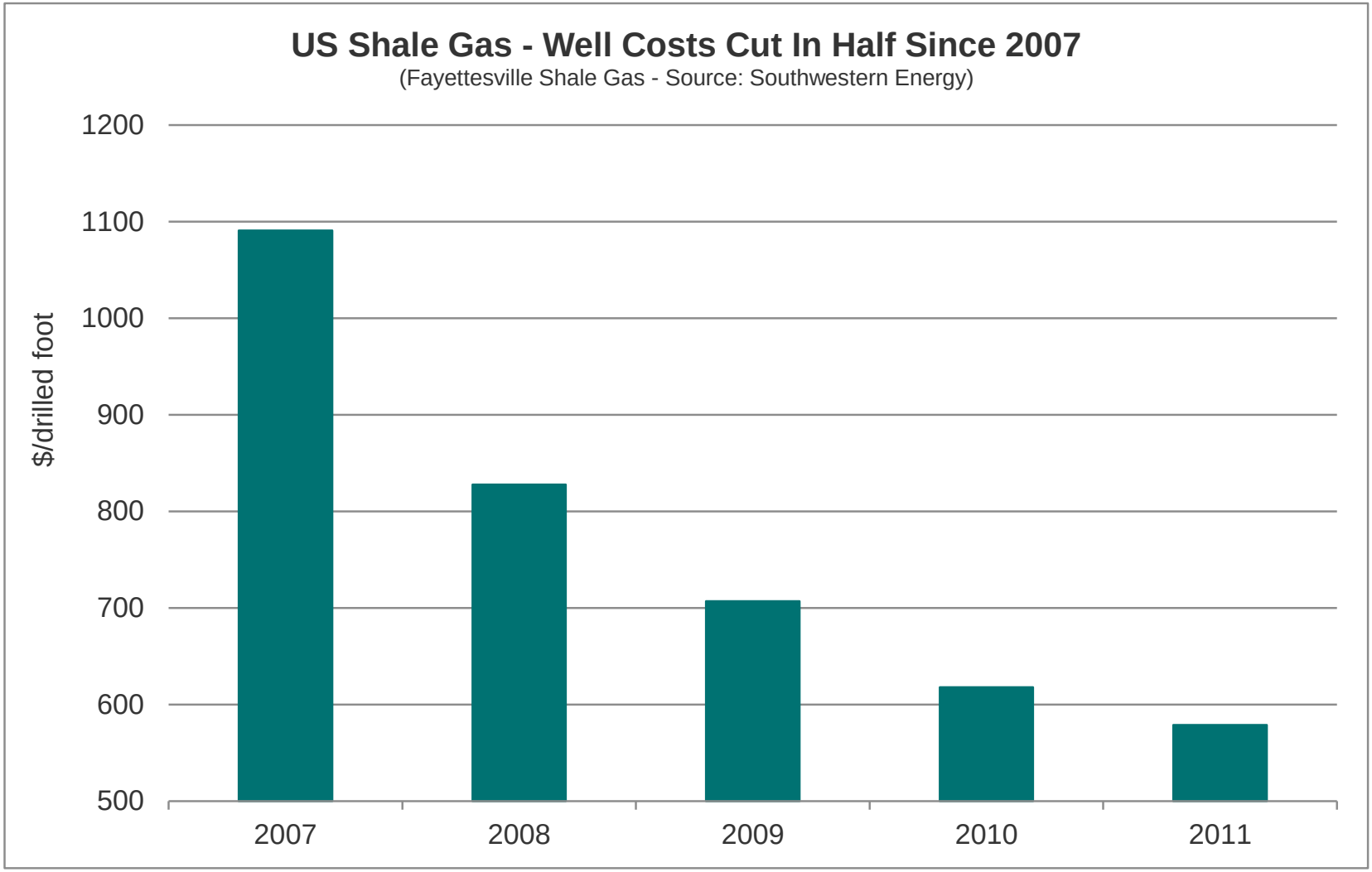
# Will Shale Liquids Costs Fall - Just Like It Did For Shale Gas?

- We think it is plausible to assume shale liquids costs will rather be lower than higher in a 5-10 year perspective

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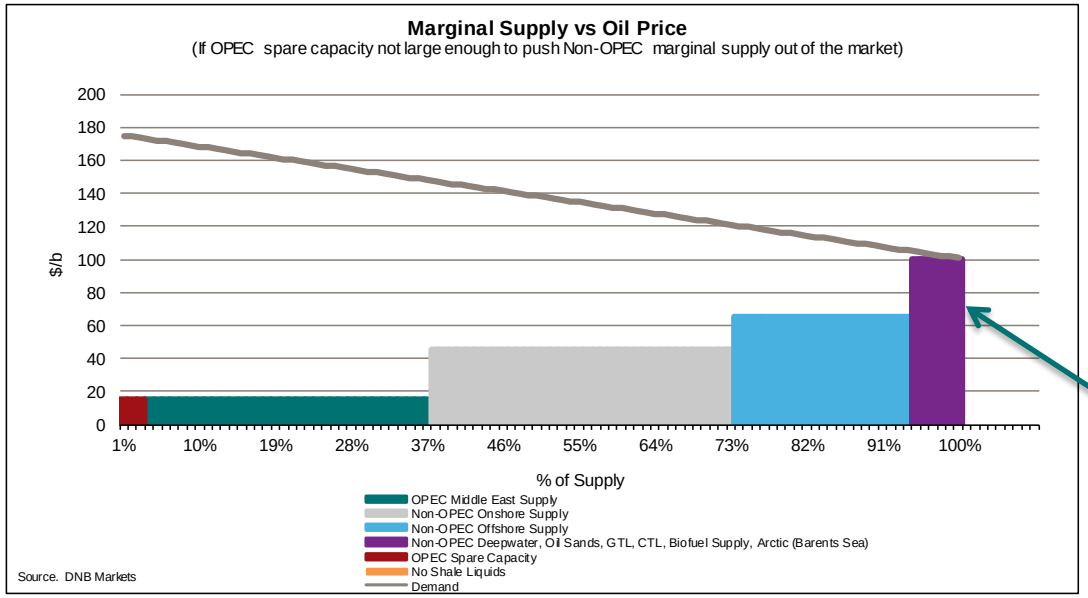
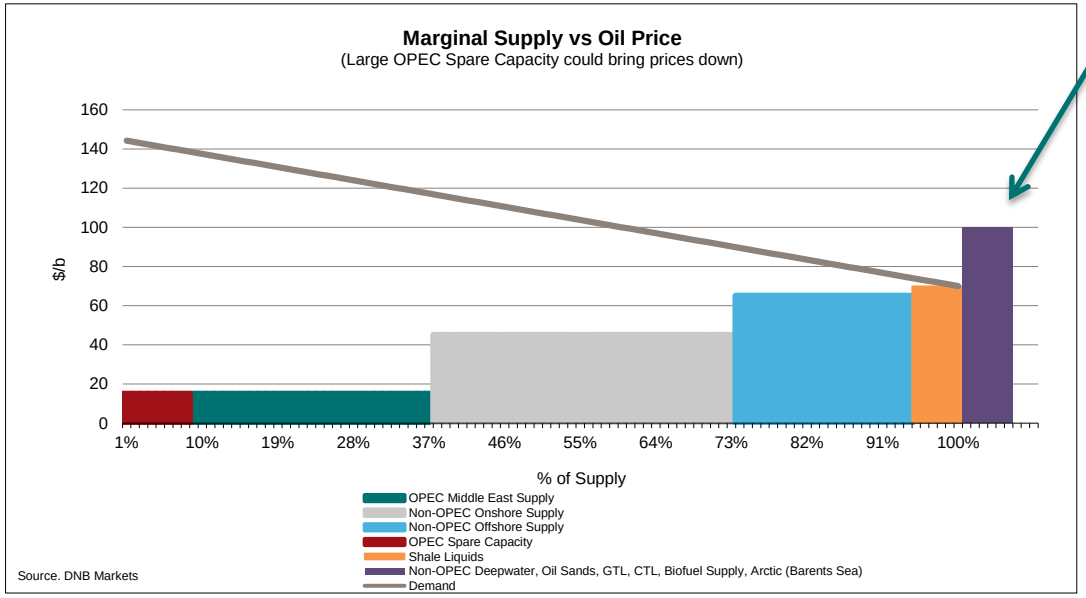
# The Most Expensive Barrels Risk Being Pushed Out By Shale Oil

- How expensive will it be to develop oil projects in the Barents Sea?




The most expensive barrels risk being pushed out of the market.
The best example of this in real life is Shtokman in the Barents sea.

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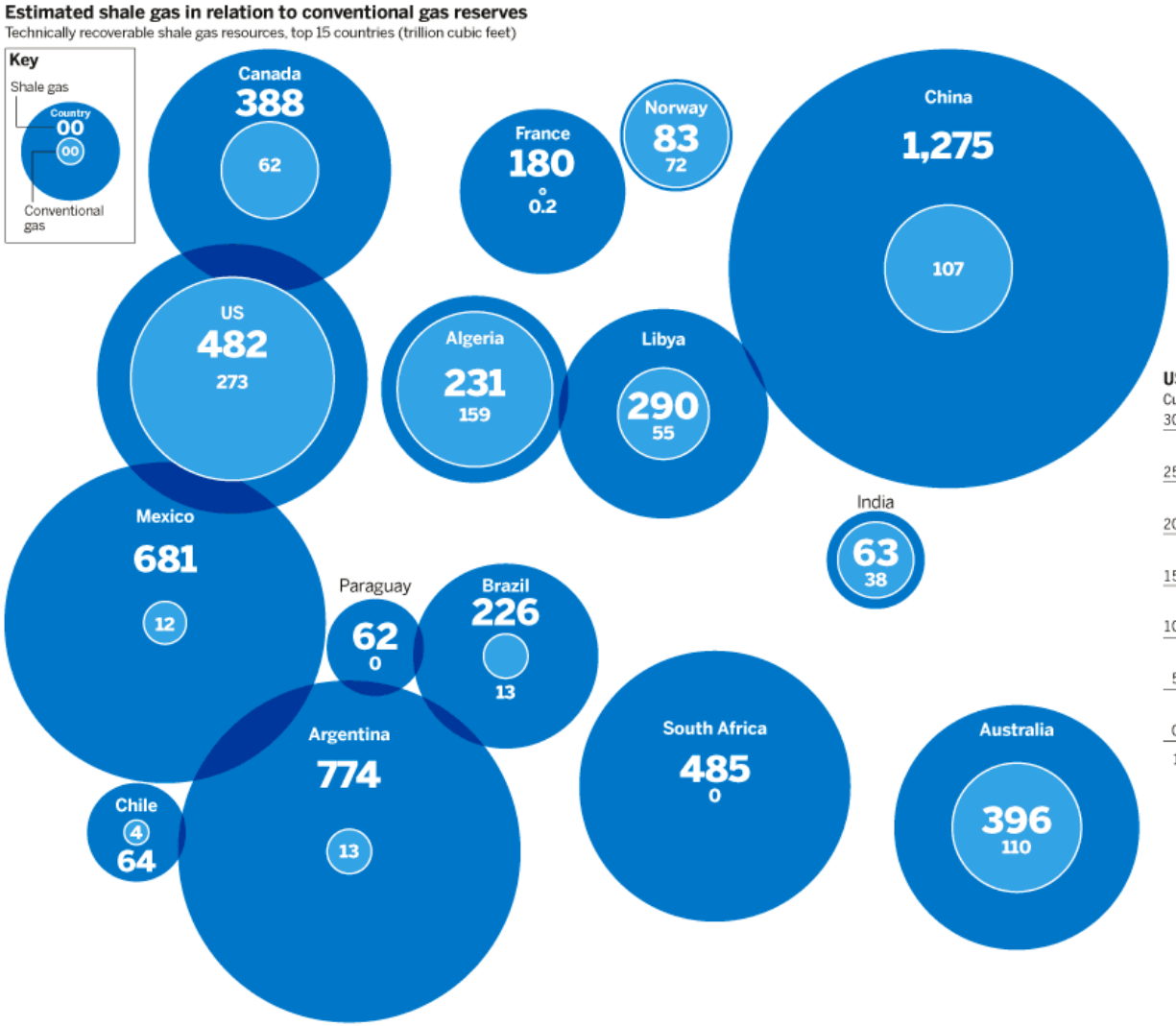
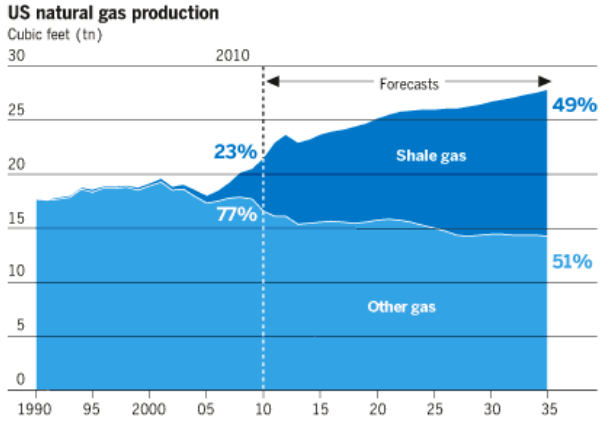
# Enormous Resources Of Shale Gas

- Suggest there are also large shale oil resources




Source: Financial Times , April 23 - 2012

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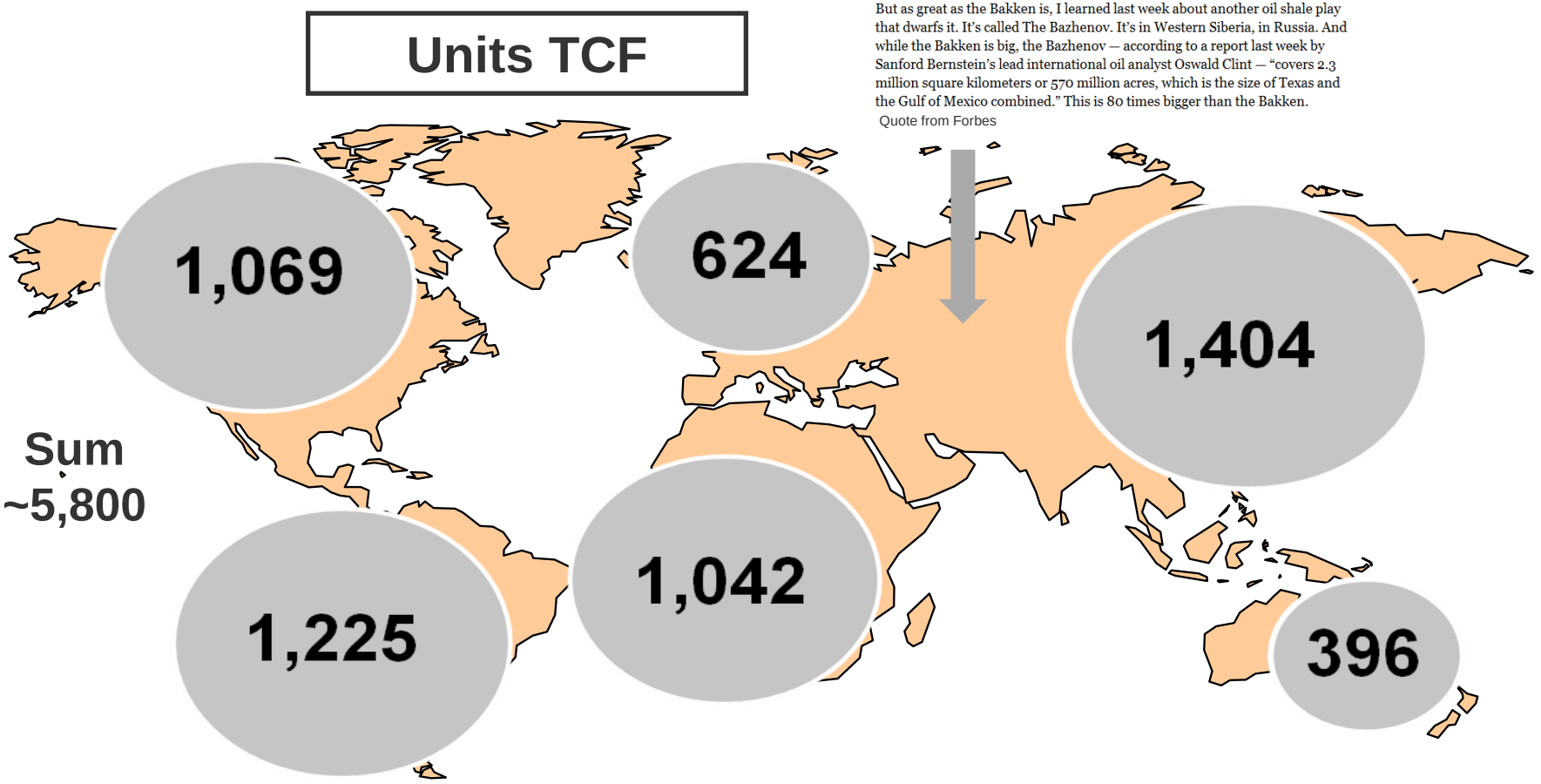
# Global Technically Recoverable Shale Gas Reserves Gigantic

## Meet The Oil Shale Eighty Times Bigger Than The Bakken

But as great as the Bakken is, I learned last week about another oil shale play that dwarfs it. It's called The Bazhenov. It's in Western Siberia, in Russia. And while the Bakken is big, the Bazhenov — according to a report last week by Sanford Bernstein's lead international oil analyst Oswald Clint — "covers 2.3 million square kilometers or 570 million acres, which is the size of Texas and the Gulf of Mexico combined." This is 80 times bigger than the Bakken.

Quote from Forbes




Source: PIRA, EIA

**Russia and Central Asia, Middle East, South East Asia, and Central Africa excluded.**



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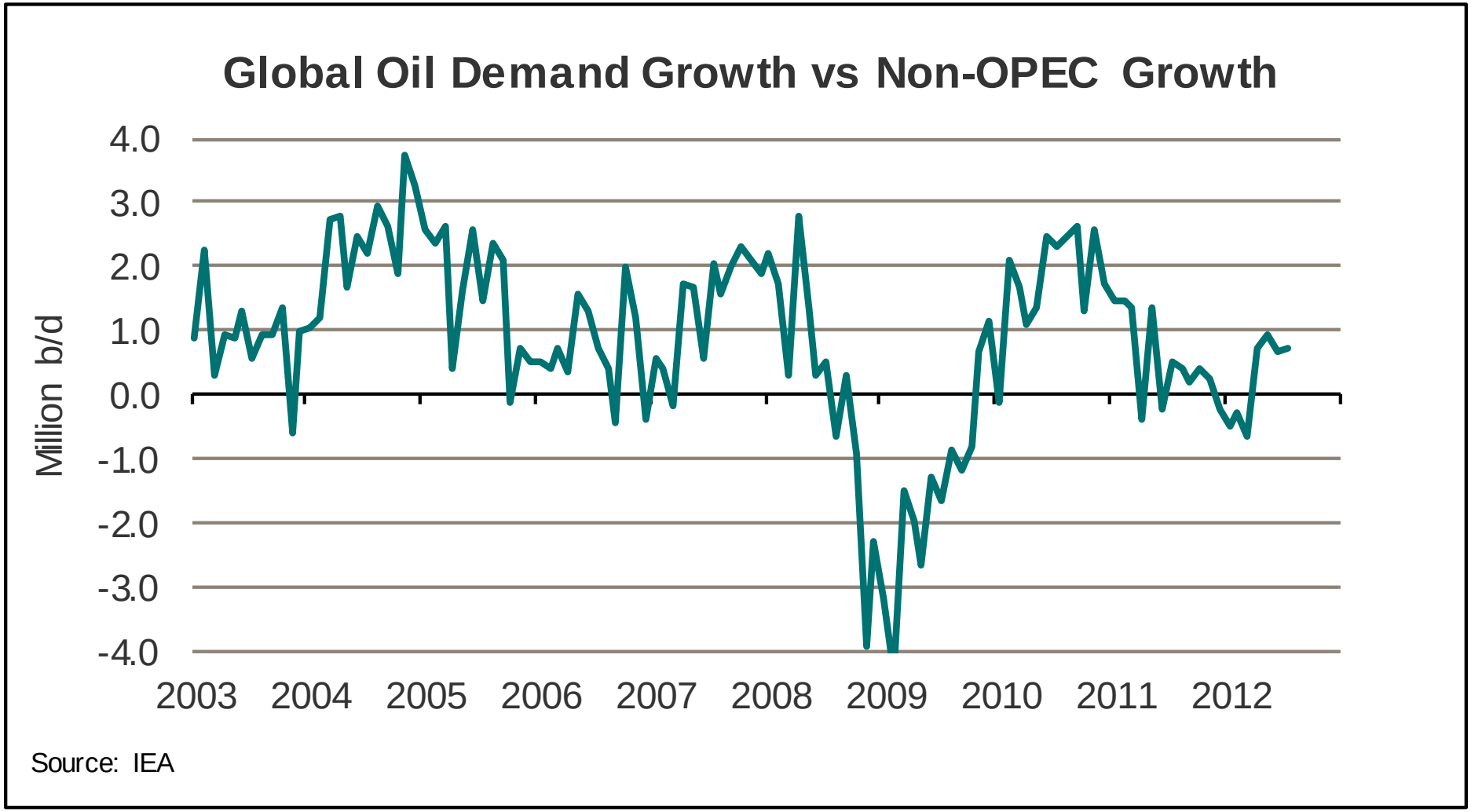
# Oil Demand Growth vs Non-OPEC Supply Growth

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# Global Supply-Demand Trends

-12 month moving average, looking much weaker than a year ago

| Current Trend Line Figures | Trend Line Growth | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2011-15 change |
|---|---|---|---|---|---|---|---|---|---|
| OECD demand | -1.5% | 45.7 | 46.3 | 45.7 | 45.1 | 44.4 | 43.7 | 43.1 | -2.7 |
| Non-OECD demand: | 2.7% | 39.9 | 42.1 | 43.3 | 44.5 | 45.7 | 47.0 | 48.2 | 4.9 |
| Total demand | | 85.5 | 88.4 | 89.1 | 89.6 | 90.1 | 90.7 | 91.3 | 2.2 |
| Demand change: | | | 2.8 | 0.7 | 0.5 | 0.5 | 0.6 | 0.6 | |
| Non-OPEC incl. Biofuels | 0.6% | 51.4 | 52.6 | 52.7 | 53.1 | 53.4 | 53.7 | 54.0 | 1.3 |
| Call on OPEC incl. NGL's | | 34.1 | 35.7 | 36.3 | 36.5 | 36.7 | 37.0 | 37.3 | 0.9 |
| Increased call on OPEC | | | 1.6 | 0.6 | 0.2 | 0.2 | 0.2 | 0.3 | |

| A year ago | Trend Line Growth | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2011-15 change |
|---|---|---|---|---|---|---|---|---|---|
| OECD demand | 2.0% | 45.6 | 46.2 | 45.6 | 46.6 | 47.5 | 48.4 | 49.4 | 3.8 |
| Non-OECD demand: | 5.0% | 39.9 | 42.2 | 43.4 | 45.6 | 47.9 | 50.3 | 52.8 | 9.4 |
| Total demand | | 85.6 | 88.3 | 89.1 | 92.2 | 95.4 | 98.7 | 102.2 | 13.1 |
| Demand change: | | | 2.8 | 0.8 | 3.1 | 3.2 | 3.3 | 3.5 | |
| Non-OPEC incl. Biofuels | 2.0% | 51.5 | 52.6 | 52.7 | 53.8 | 54.8 | 55.9 | 57.1 | 4.3 |
| Call on OPEC incl. NGL's | | 34.1 | 35.7 | 36.4 | 38.4 | 40.5 | 42.8 | 45.1 | 8.8 |
| Increased call on OPEC | | | 1.6 | 0.6 | 2.0 | 2.1 | 2.2 | 2.4 | |

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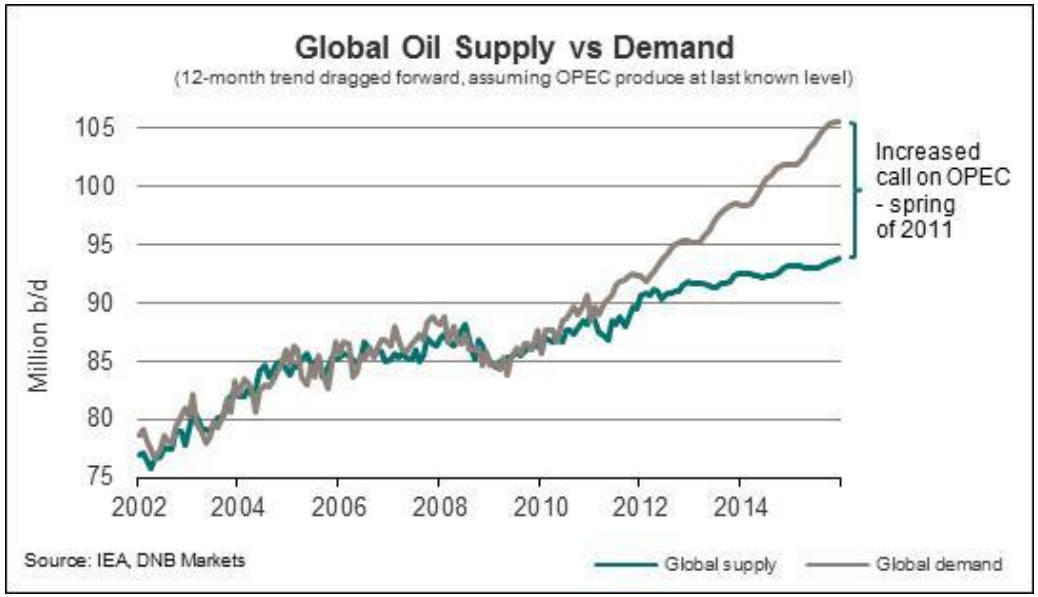
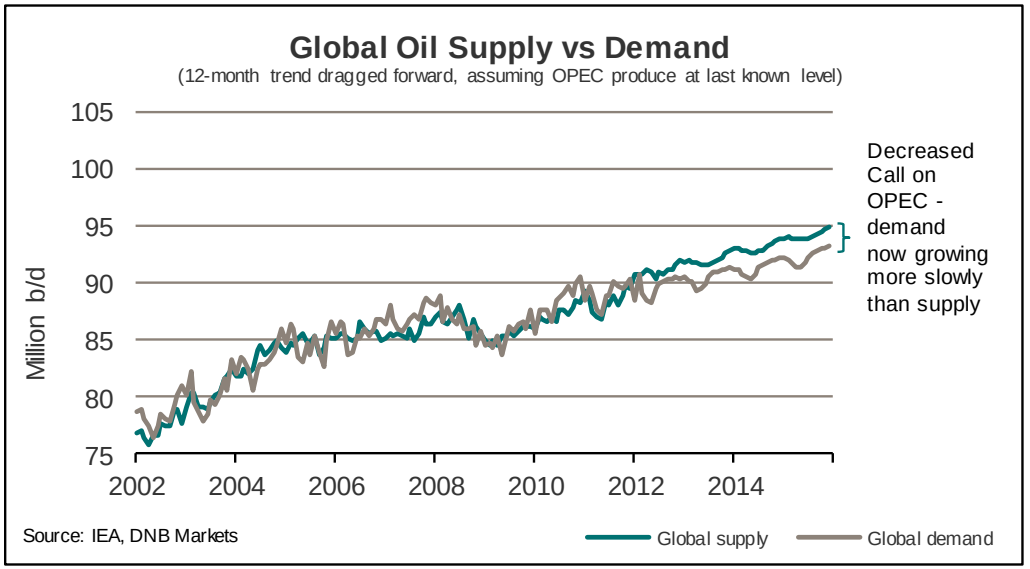
# Global Supply-Demand Trends

-12 month moving average based on the latest monthly data suggest decreasing 'Call on OPEC' in coming years

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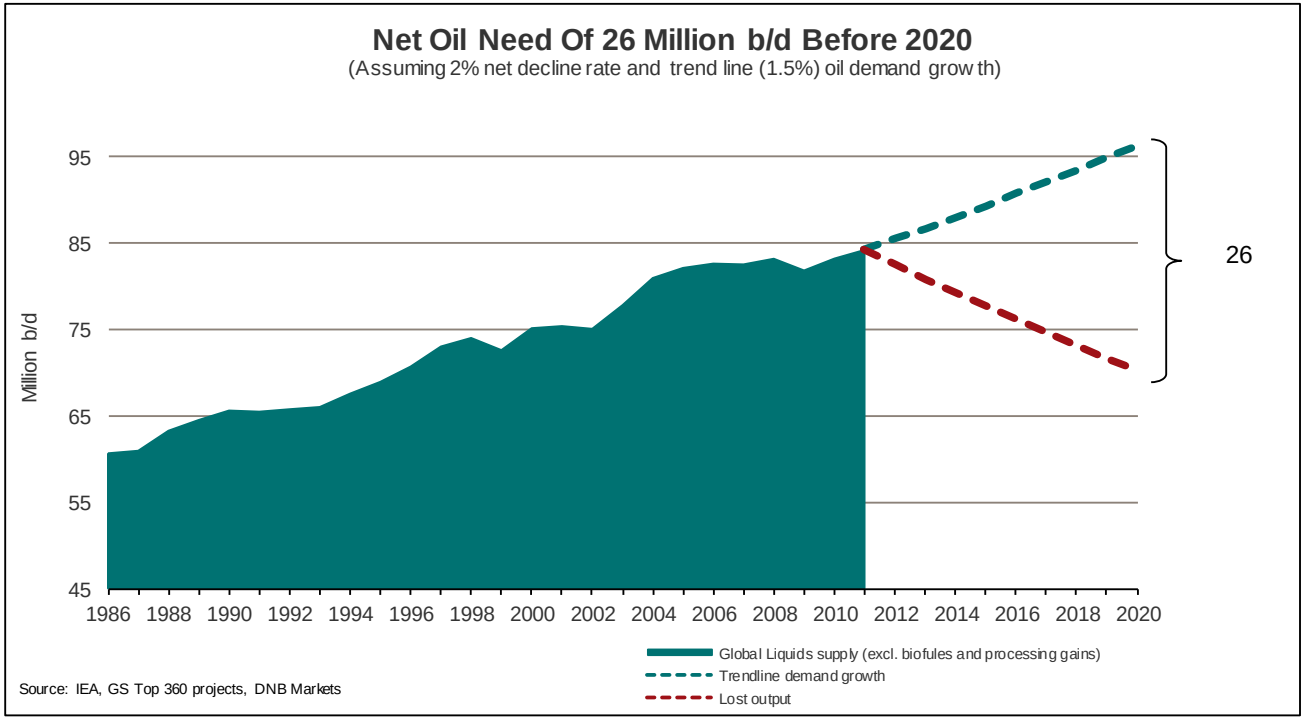
# The Worlds Largest Projects Will Alone Cover The Gap By 2020

- **World 360 top projects:**
  - Estimated growth in world oil liquids supply from the worlds top 360 projects 2011-2020: **26** million b/d.
  - Harvard study of the top 23 oil producing countries: **29** million b/d (unrisked 50 million b/d).
- **Decline rates plus demand growth:**
  - Lost supply from decline rates (2% net decline): **14** million b/d from 2011-2020. Harvard study: **11** million b/d.
  - Trend line demand growth (1.5%): 2011-2020; **12** million b/d.
- **The whole gap of 26 million b/d by 2020 can be covered by the top 360 projects.**




Source: DNB Markets, IEA, Goldman Sachs top 360 projects - March 2012, Harvard Kennedy School – Belfer Center



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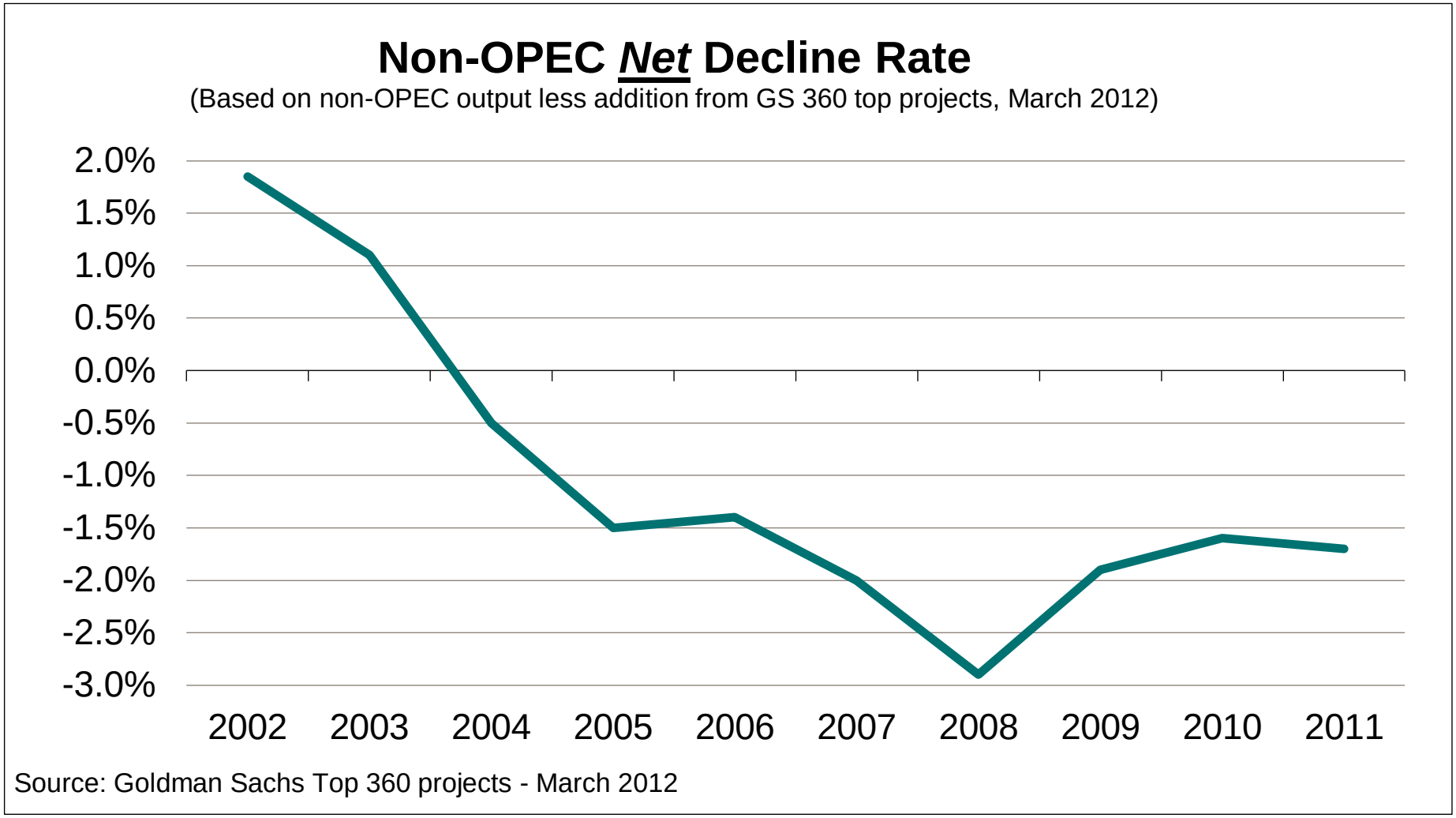
# The Gross Decline Rate Is Not As Interesting As The Net Decline

-One should focus on *net* decline rates. Not all fields are in decline, many are in ramp up. Net decline is lower than many are aware of.

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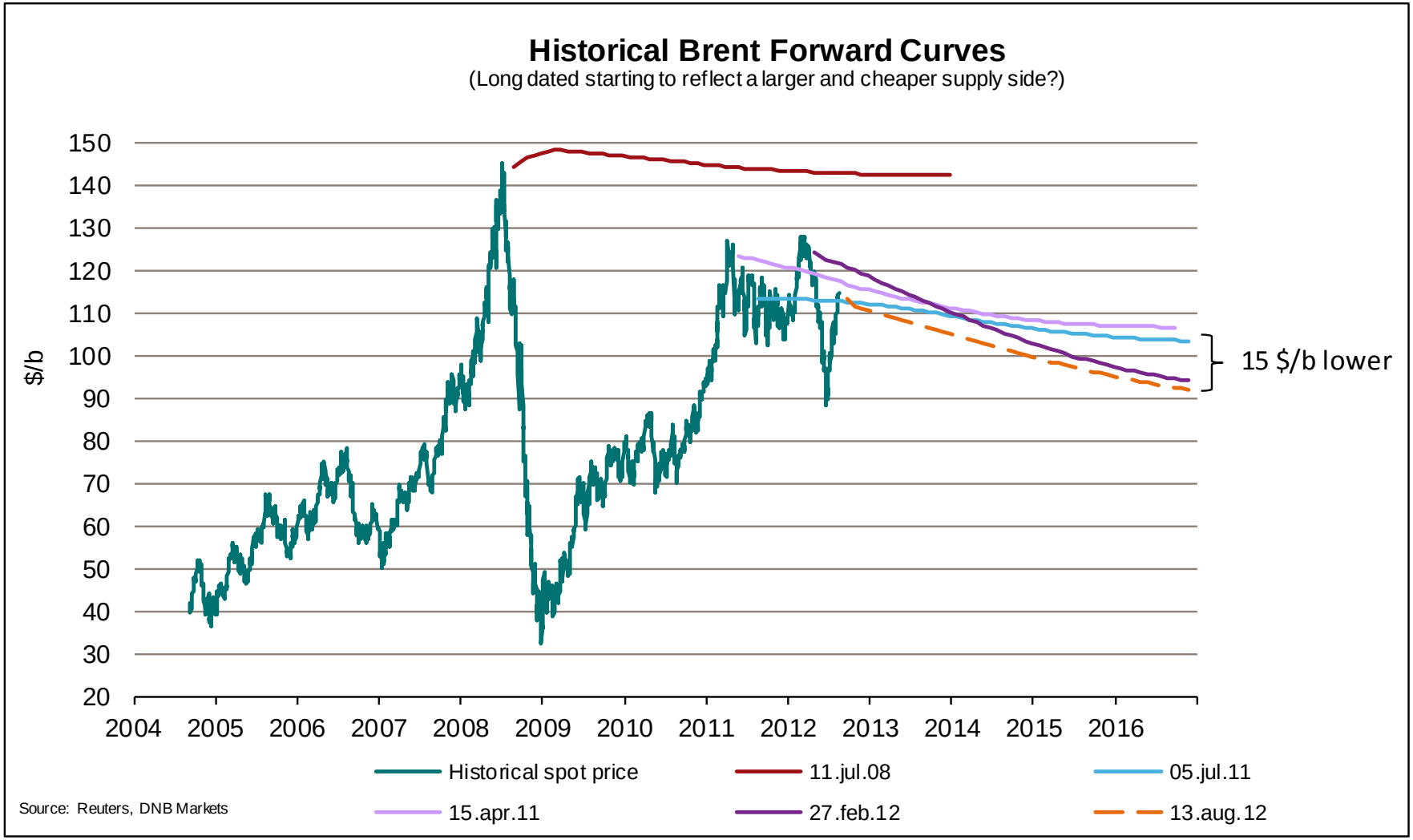
# Long Dated Prices Starting To Reflect The Shale Revolution?

- Does that mean longer dated prices will continue to fall as the cost to bring these shale barrels to market drop over time??







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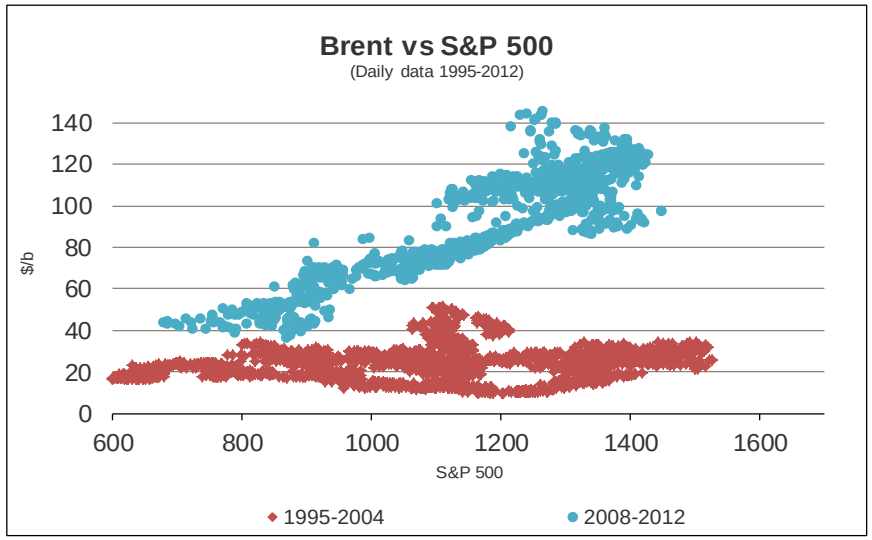
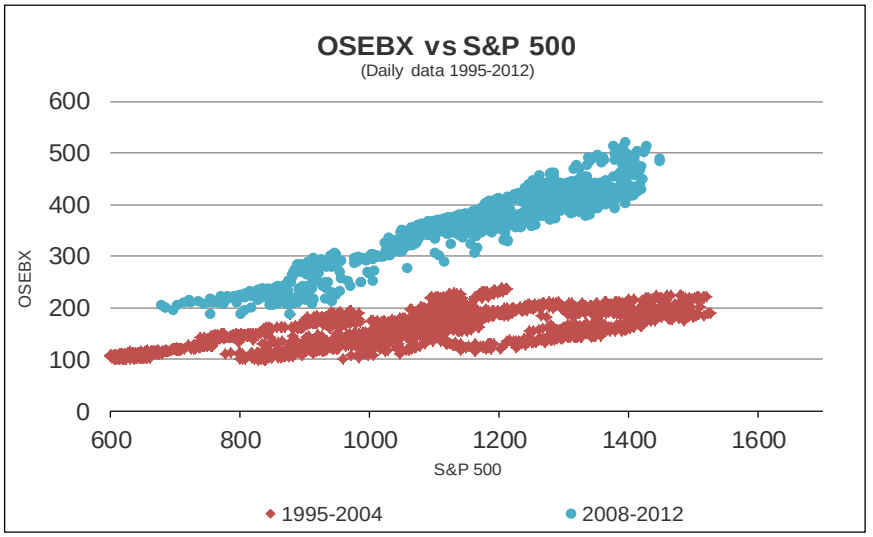
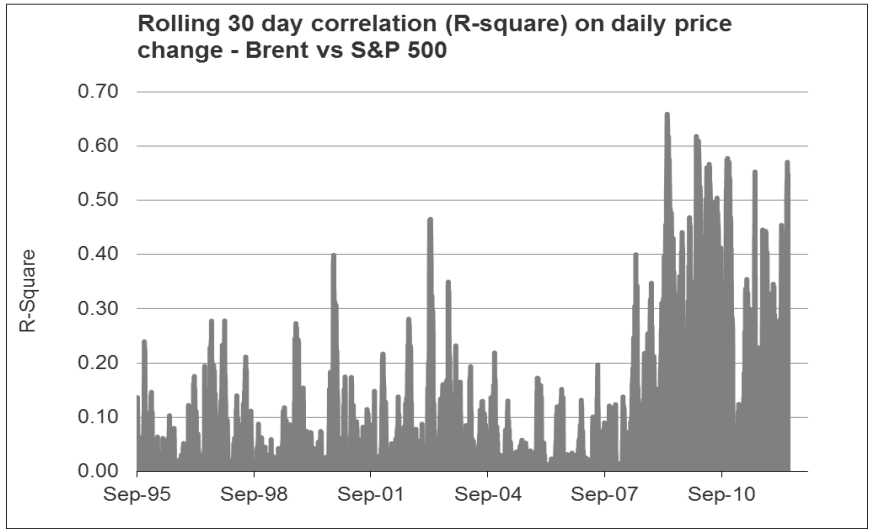
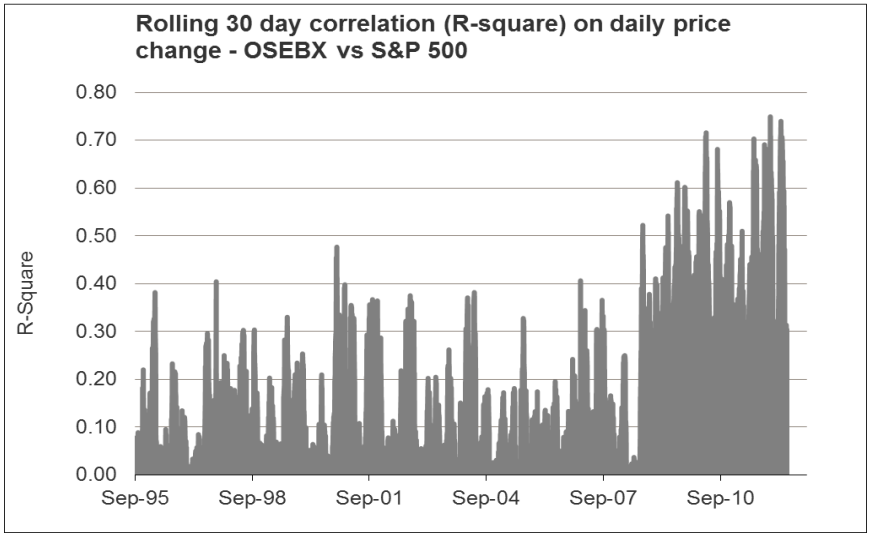
# Lower Oil Prices Set To Weaken The OSEBX vs S&P 500 Link

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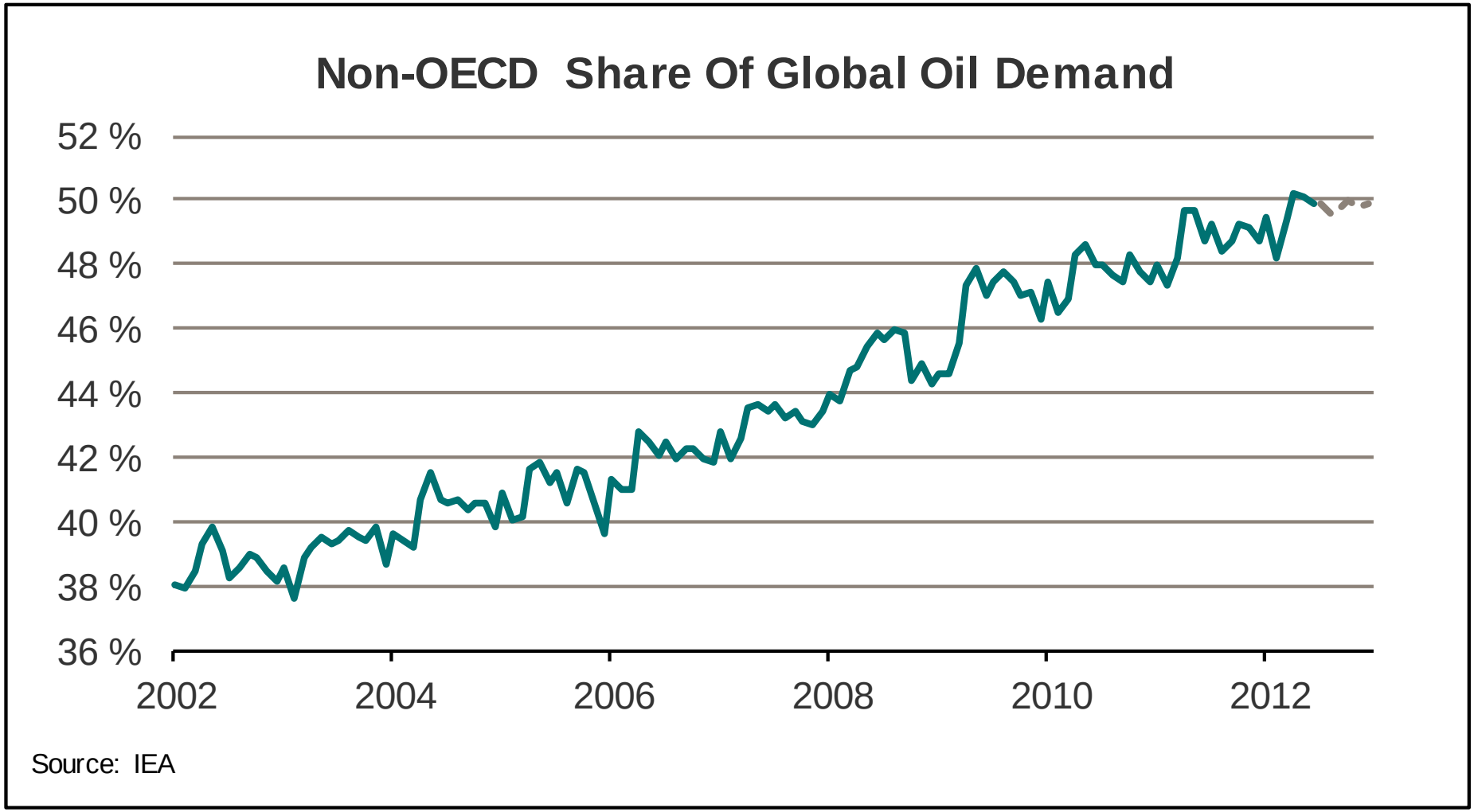
# Non-OECD Has Reached Half Of The Global Market Share



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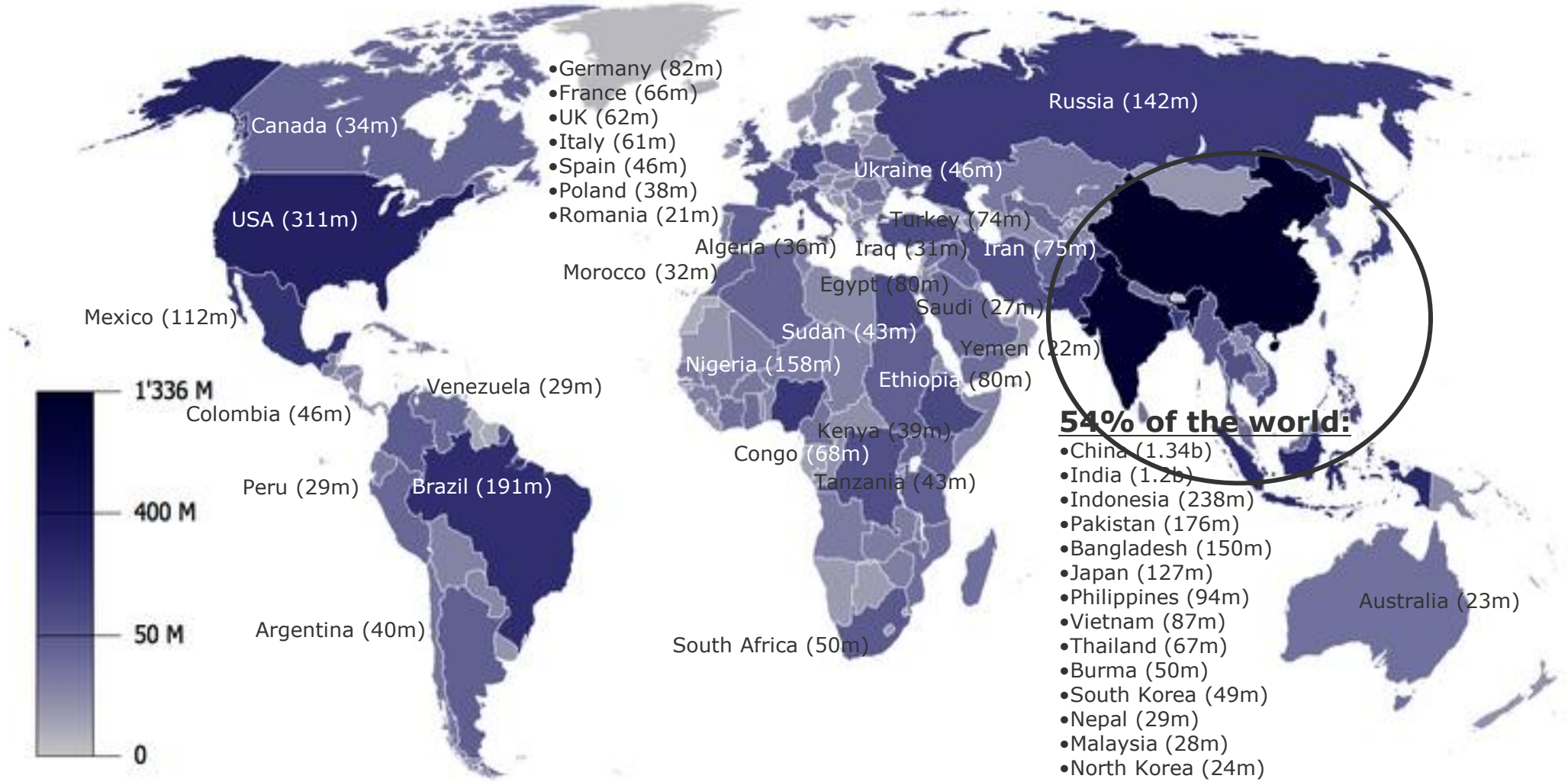
# World Population By Country

(Sources 2009-2011)




**54% of the world:**

- China (1.34b)
- India (1.2b)
- Indonesia (238m)
- Pakistan (176m)
- Bangladesh (150m)
- Japan (127m)
- Philippines (94m)
- Vietnam (87m)
- Thailand (67m)
- Burma (50m)
- South Korea (49m)
- Nepal (29m)
- Malaysia (28m)
- North Korea (24m)
- Taiwan (23m)
- Sri Lanka (20m)
- Cambodia (13m)



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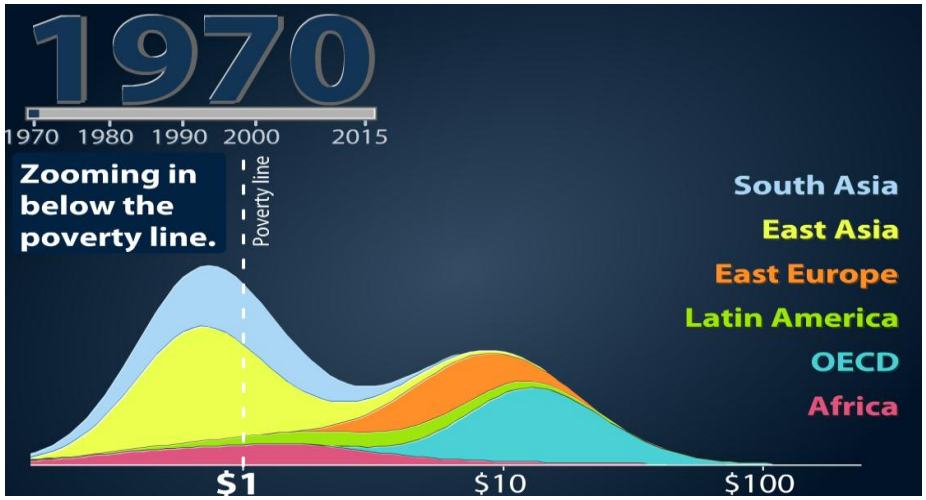
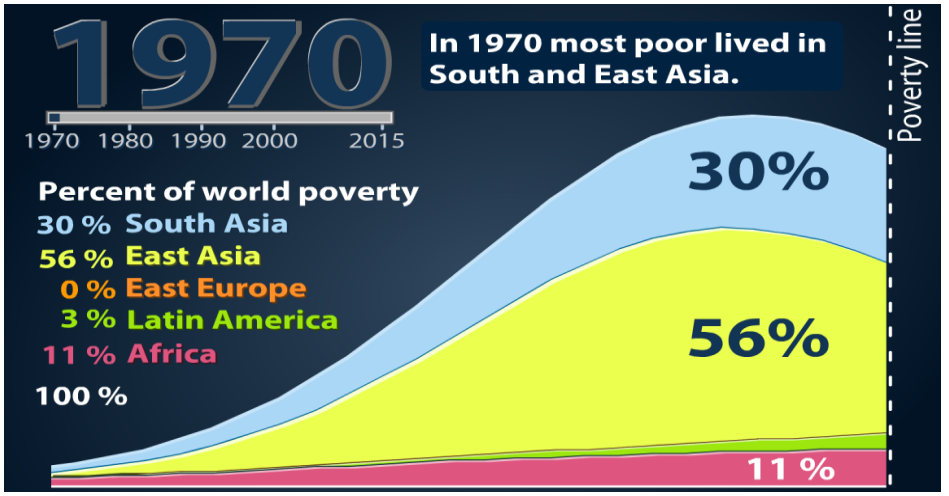
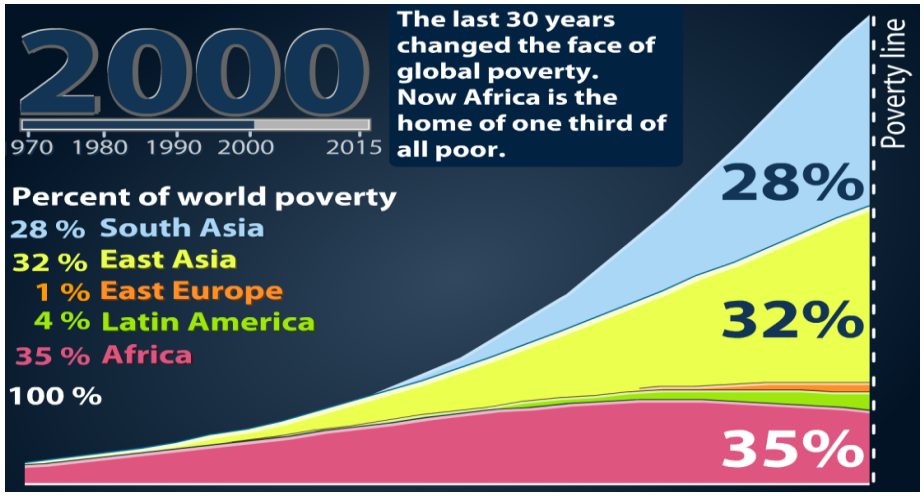
# In 1970, 86% Of The Worlds Poor Lived In Asia

- In 2015, only 25% of the worlds poor are set to live in south and east Asia





Source: UN Development Trends, Gapminder

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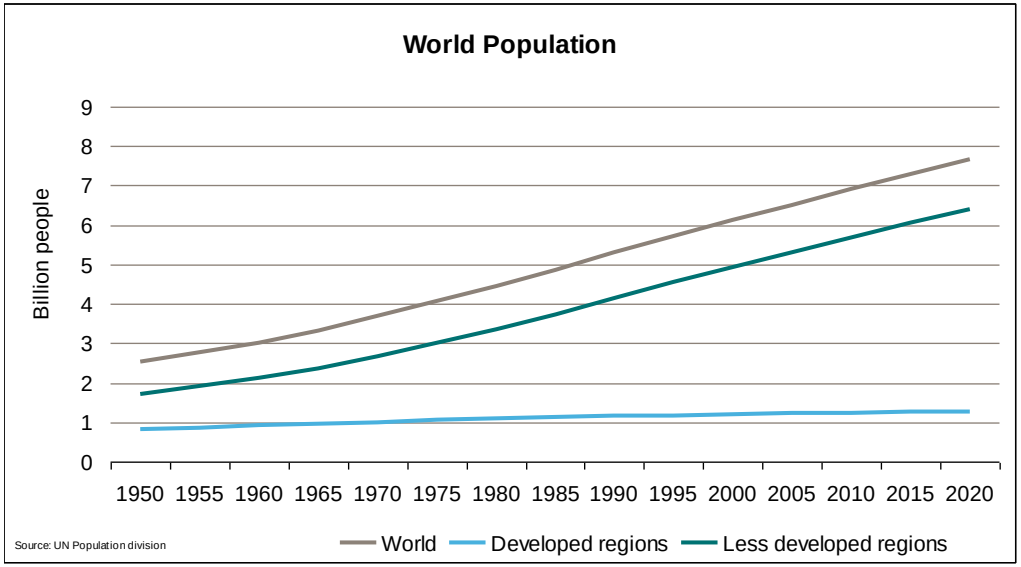
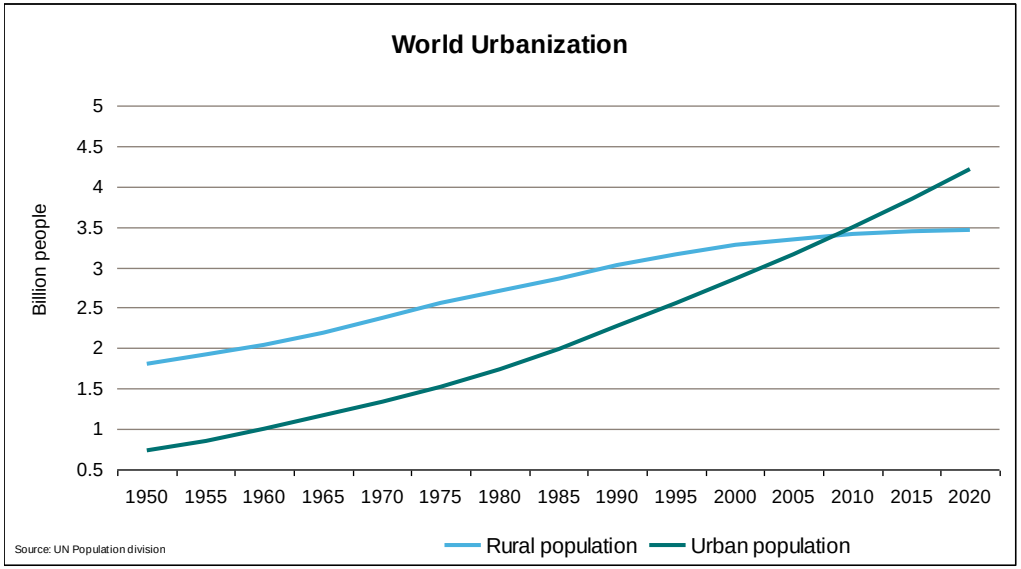
# Population Growth & Urbanization Comes On Top

- On top of the expansion in the middle class, urbanization and population growth continues in the emerging markets







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# Chinese Economic Growth & Oil Demand Growth

- No statistical significant relationship on quarterly or yearly data, but last three years is a good fit




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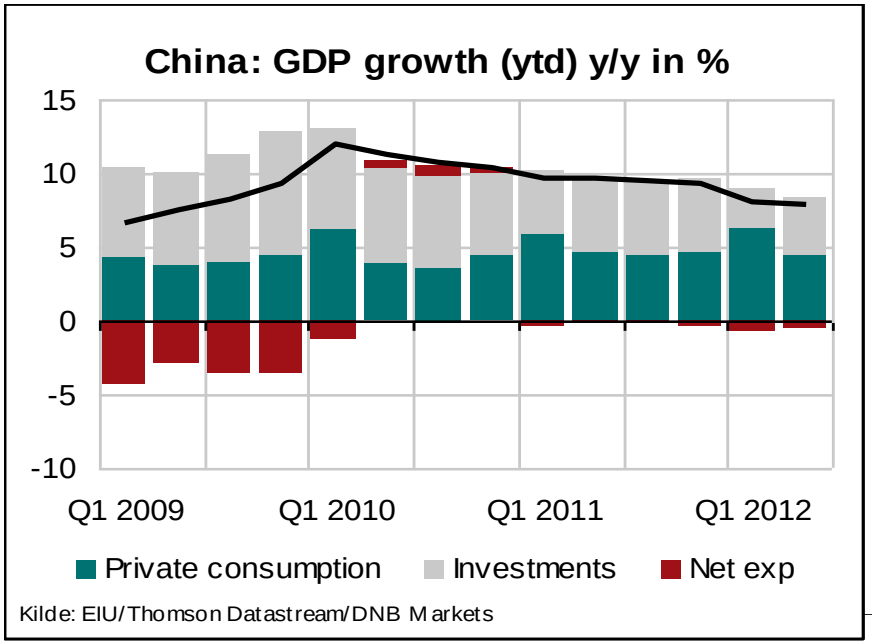
# Chinese Economic Growth

- **Main development: Growth will slow in the coming years, but a hard landing will be avoided**
- Going forward, growth is expected to fall as the government pursues a more stable economy.
- Investment growth will decline, reflecting higher input prices in manufacturing. Consumption growth will remain strong as labor compensation increases. Net exports likely to only marginally affect growth.

Kilde: Thomson Datastream/DNB Markets



Kilde: EIU/Thomson Datastream/DNB Markets

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# The Main Downside Risks To Chinese Economic Growth

- **The euro area crisis.**
  - A worsening would put further downward pressure on Chinese exports which will lead to lower growth in manufacturing (recall that about 90% of total exports are produced in the manufacturing sector). Will lead to a contraction in private investments and bring unemployment up. Households will respond by reducing consumption growth due to i) reduced income growth and ii) higher precautionary saving. The slowdown may be reduced by further monetary and fiscal expansion, but this may only partially offset the first round effects from reduced demand and higher uncertainty.

- **The new government fails to pursue economic reforms.**
  - Initially this will lead to higher growth in short to medium term as investments will increase and enterprises gain ground on new subsidies. Will lead to higher imbalances (externally and internally) with an increasing CA-surplus, higher saving rate and stagnant consumption (as share of GDP). In the long term risks of a hard landing **is substantially higher**, as overcapacity in manufacturing and underdevelopment in services will persists.

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# Investments Cannot Continue @ 50% Of GDP Growth In China

- The consumption part of GDP growth must soon start to climb – Zero growth in China's investments will halve the GDP growth





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# China: Key Economic Data & Forecasts

| Macro economic key data, China | | | | | |
|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2012* | 2013* |
| Private consumption | 9.6 | 11.4 | 8.5 | 9.0 | 8.9 |
| Public consumption | 5.6 | 7.3 | 9.3 | 9.2 | 8.1 |
| Gross investments | 22.7 | 12.0 | 9.5 | 8.2 | 8.0 |
| Exports | -11.8 | 26.5 | 4.2 | 4.1 | 5.0 |
| Imports | 2.0 | 19.8 | 4.6 | 5.8 | 7.9 |
| GDP | 9.0 | 10.5 | 9.3 | 7.9 | 7.5 |
| Unemployment | 4.3 | 4.2 | 4.1 | 4.2 | 4.2 |
| CPI | -0.7 | 3.3 | 5.4 | 2.8 | 3.5 |
| USD/CNY | 6.83 | 6.77 | 6.46 | 6.35 | 6.40 |

Source: Thomson Datastream/DNB Markets

*Forecasts

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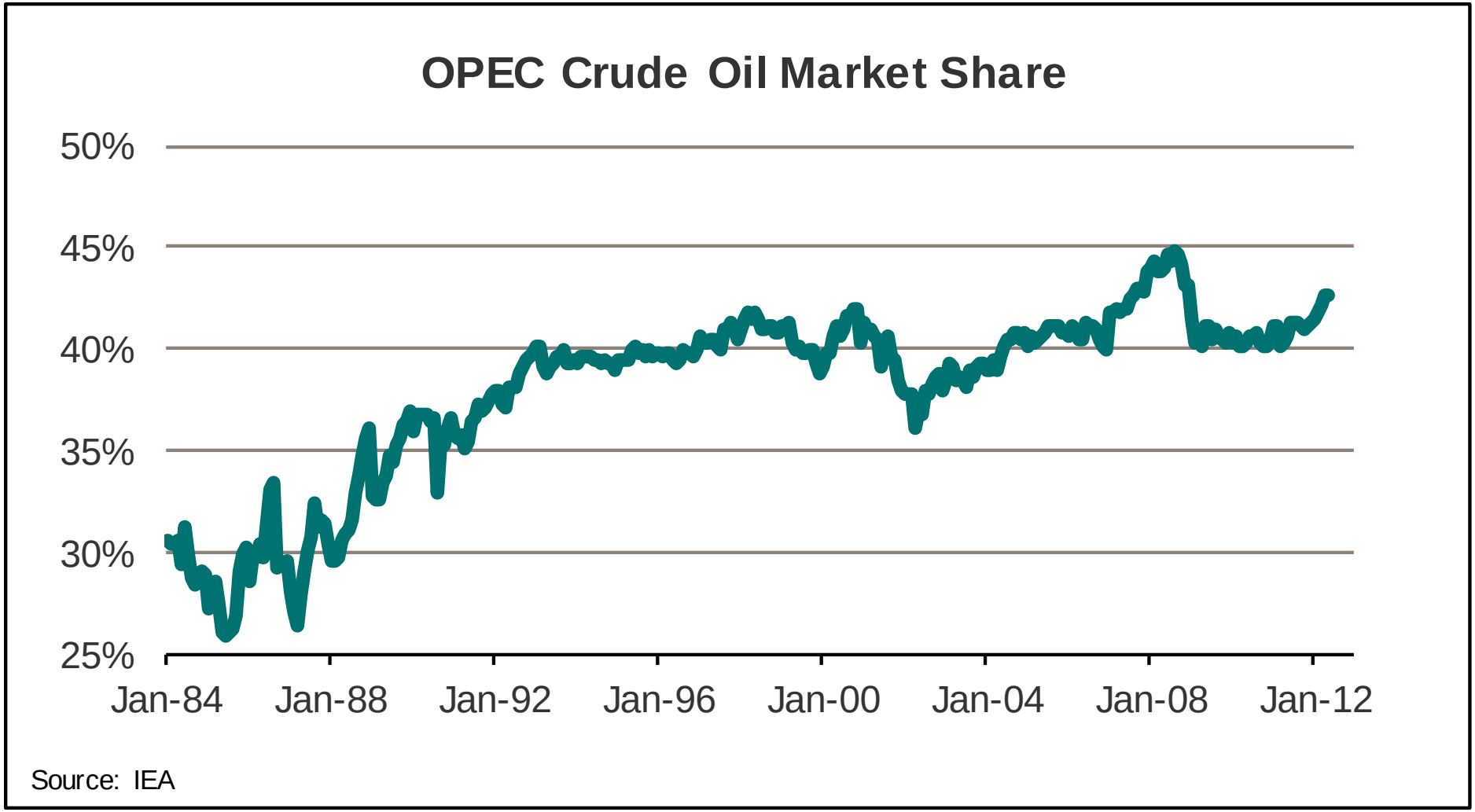
# OPEC Market Share Forced Higher By Weak Non-OPEC

- OPEC has more downside control the higher it's market share




Source: IEA

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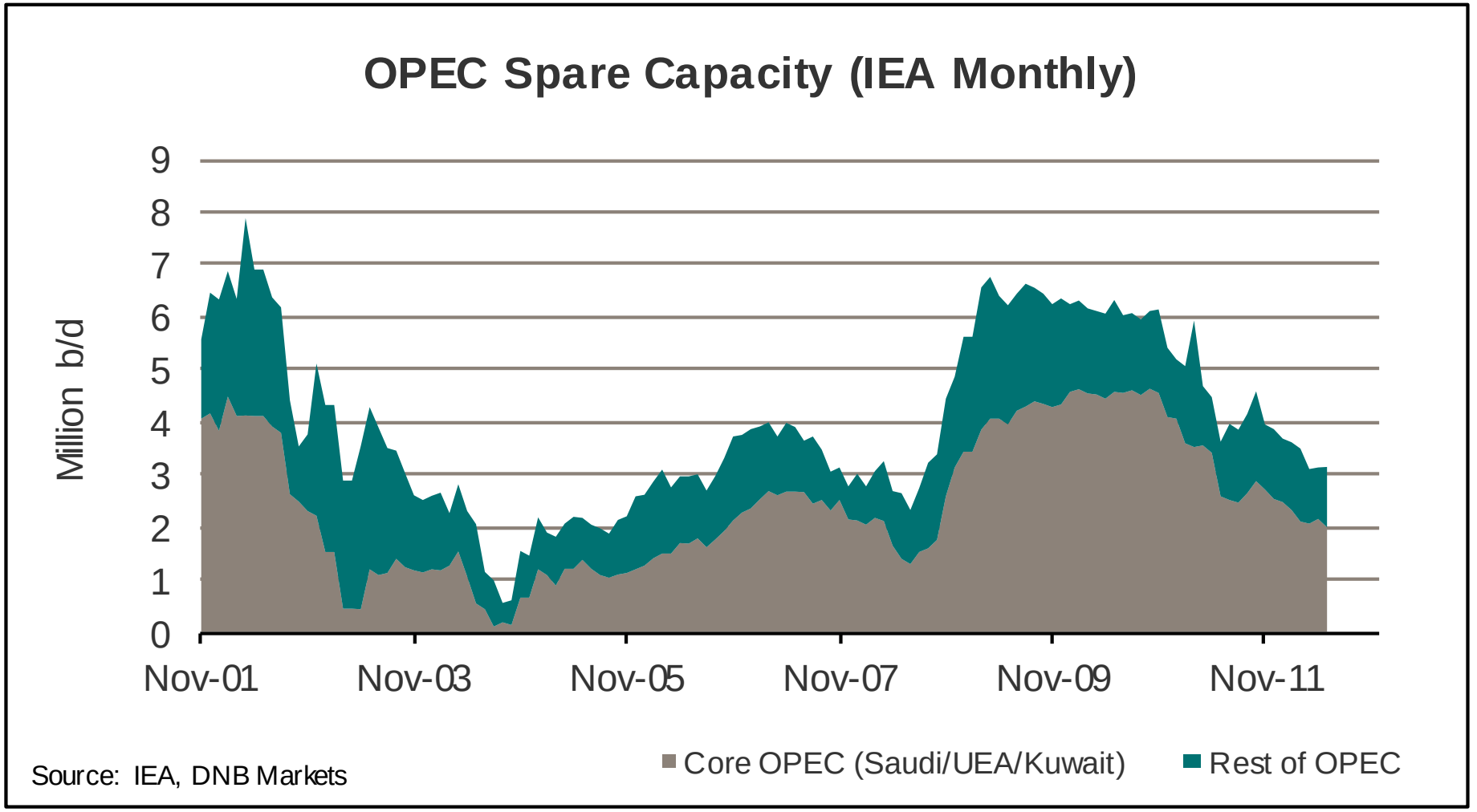
# OPEC Spare Capacity Reduced Since 2009

- This is the flip side of the increased Saudi production




Source: IEA Monthly Oil Market Reports



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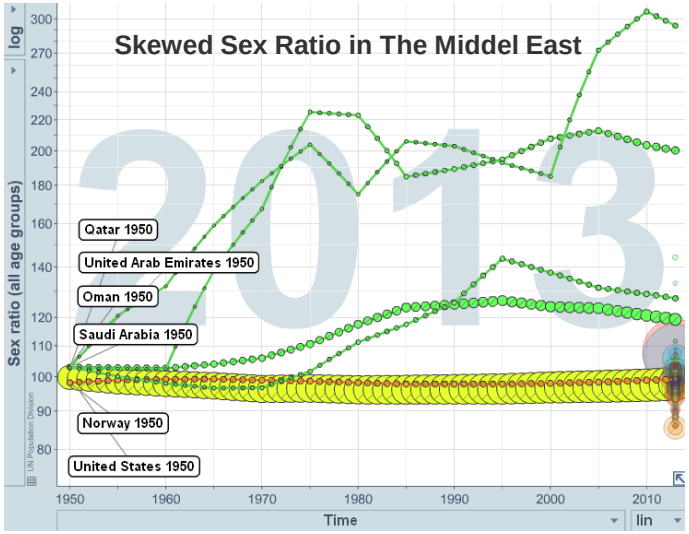
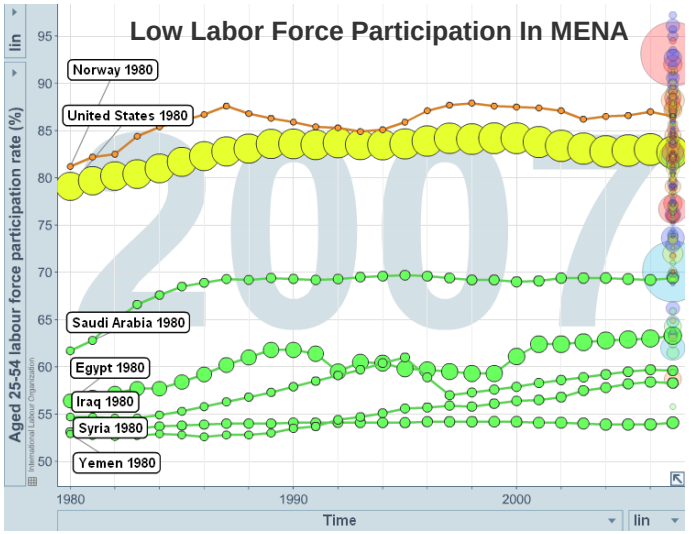
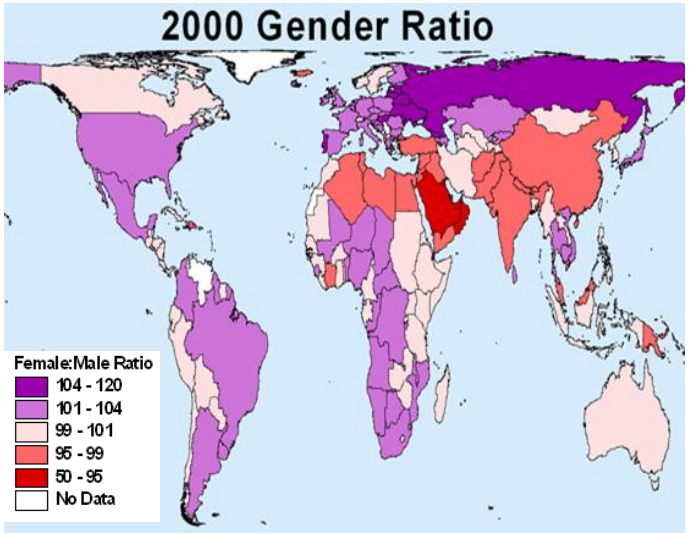
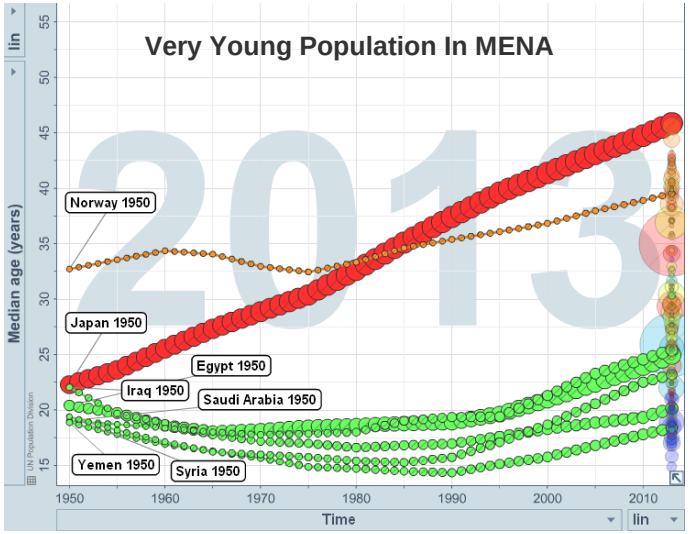
# MENA: Sex Ratio – Unemployment - Young Population

- A recipe for social unrest




Source: International Labor Organization, UN Population Division, Gapminder

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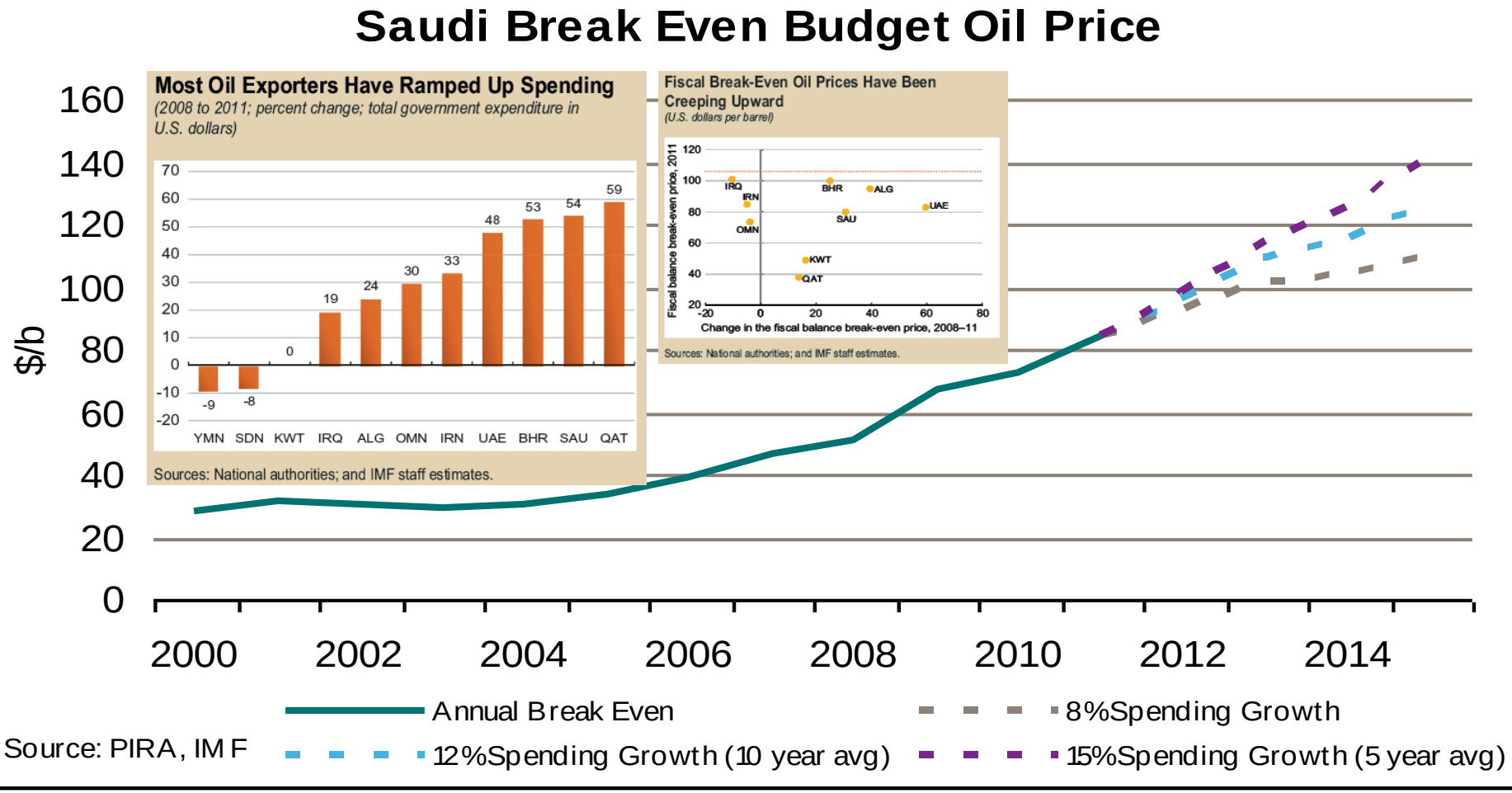
# Saudi Requires Higher Oil Prices To Balance The Budget




Source: PIRA, IMF

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# The Saudi Price Target

- Both upwards and downwards pressure

- **Internal Domestic Budget**
- Fighting Taxation In Consumer Countries
- Political Pressure From Other OPEC Countries
- Weak US Dollar

Upped to 100 $/b Brent?
Old target 70-80 $/b Brent

Saudi Arabia's Al-Naimi on June 8 - 2011 when asked if Saudi Arabia still favour an oil price of 70-80 $/b:
**"That was several years ago".**
The same Al-Naimi in a CNN interview on January 16th - 2012:
**"Our wish and hope is we can stabilise this oil price and keep it at a level around 100 $/b".**

- Long Term Sustainability
  - **Demand**
  - **Non OPEC Supply**
  - New Energy Technology
- Political Pressure From Big Consumer Countries

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# The Saudi Royal Family

**Abdul Aziz (Ibn Saud)**
- King: 1902-1953
- Founded Saudi Arabia in 1932
- 22 wives (4 at a time)
- 45 sons of which 5 have been kings

**King Saud**
- King: 1953-1964
- Forced out

**King Faisal**
- King: 1964-1975
- Killed

**King Khalid**
- King: 1975-1982
- Heart Attack

**King Fahad**
- King: 1982-2005
- Stroke

**King Abdullah (88)**
- King: 2005-
- Regent since 1995
- Unifying and popular
- 6 sons

**Crown Price Sultan (80)**
- Died 23.10.2011

**Crown Price Naif (79)**
- Ultra conservative
- Died 16.06.2012

**New Crown Price Salman (76)**
- 25th son of Ibn Saud
- Defence Minister
- Well regarded
- Trusted mediator
- Had a stroke in 2010

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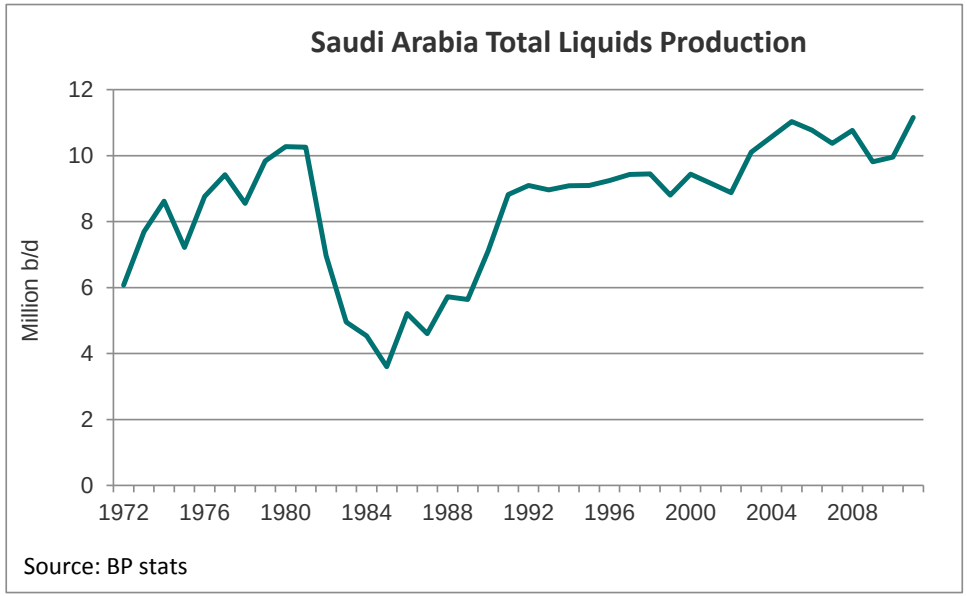
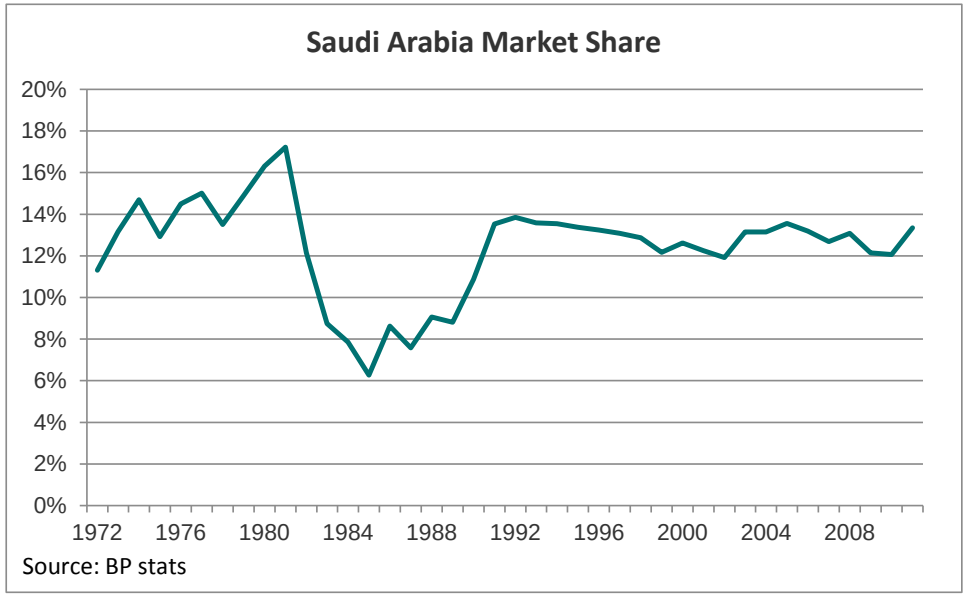
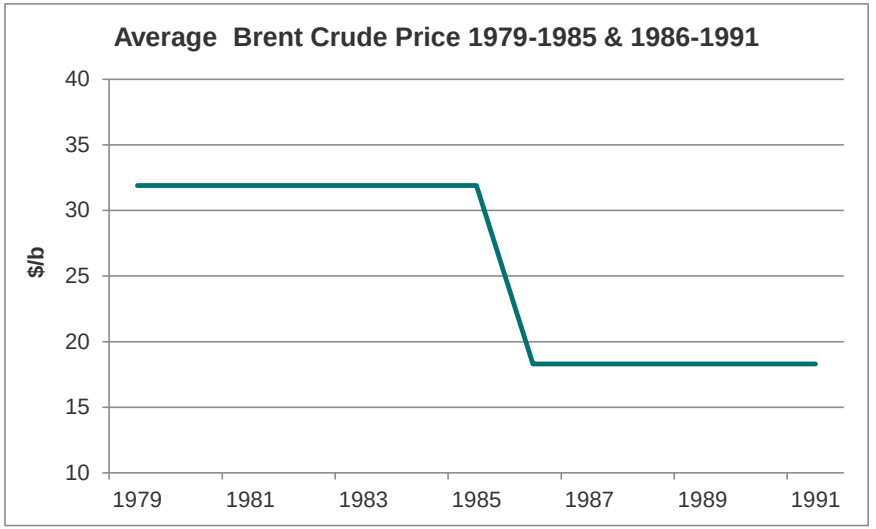
# Do We Risk A Repetition Of 1986-1991 From Saudi?

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# Shorter Term

Second half 2012 & 2013



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# Bullish & Bearish Oil Price Factors For The Second Half 2012

- **Bullish Factors**
  - Seasonal upswing in demand
  - Refineries coming out of maintenance to solid margins
  - **Geopolitical risks in the middle east – particularly relating to the Iranian nuclear program**
  - Hurricane season
  - **Iran Embargo/Financial sanctions (How many barrels will be affected? Looks to be more than initially expected)**
  - Seasonal north sea field maintenance
  - Still cargoes moving from north sea to Korea due to trade agreement (3% lower tax)
  - Seasonal lower exports capabilities in Saudi Arabia (burning crude to generate power in the summer)
  - Break even prices  for Bakken shale crude in North Dakota is not too far above the current market
  - **A possible QE3 or general increased liquidity would be positive for oil prices**
    - **EU bank package, possible action from the FED, lower interest rates in China, EU, etc, etc**

- **Bearish factors**
  - **Weak global fundamental balance despite the lost barrels from Iran**
  - **High oil inventories (US at record crude stocks level since 1991 this summer and OECD stocks on the high side if measured in days of demand coverage)**
  - Possible SPR release if the price increase back towards 120 $/b (US elections…)
  - **Euro crisis – No end in sight**
  - Weak demand growth - macro economic numbers
  - **Chinese oil-data has been weak recently – need to pick up the next 6 months for prices to rise further**
  - Chinese SPR buying could be all done for 2012
  - **The US shale liquids revolution has started to price into the back end of the curve**
    - If a critical mass start to believe US will become net zero oil importers this will price in many years before the imports independency actually happens

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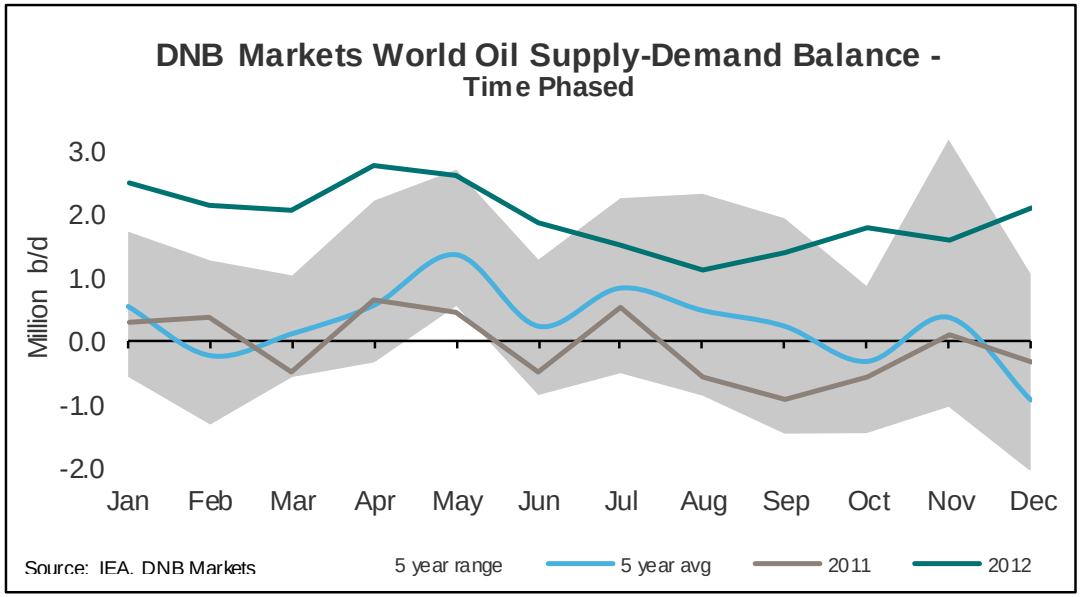
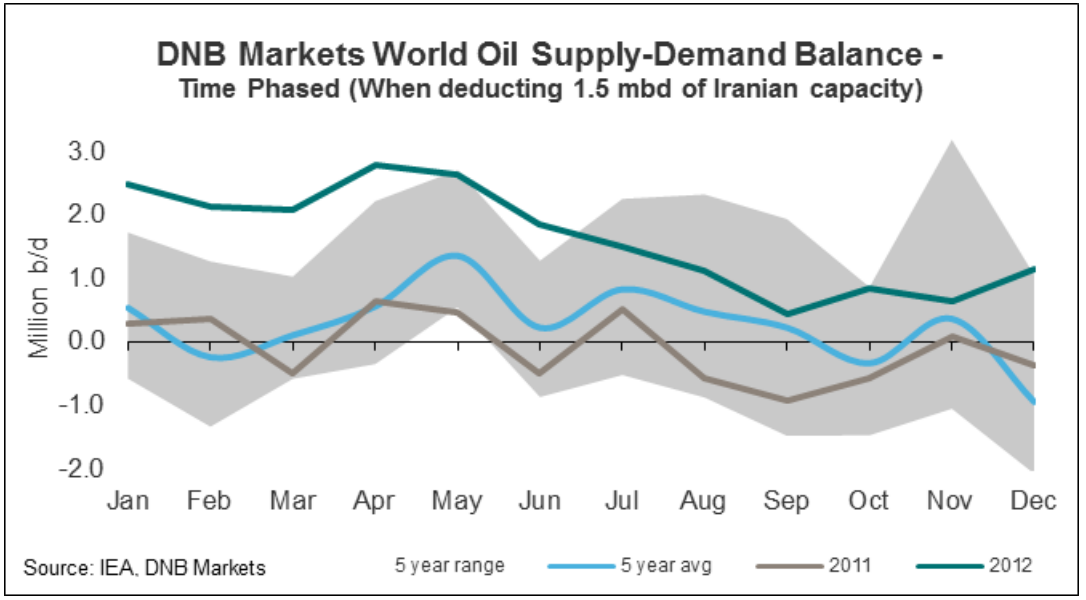
# Large Stock Builds Seen For 2012

- That is if OPEC maintain total crude output at 31.4 million b/d (which is 1.4 million b/d above the current production target)



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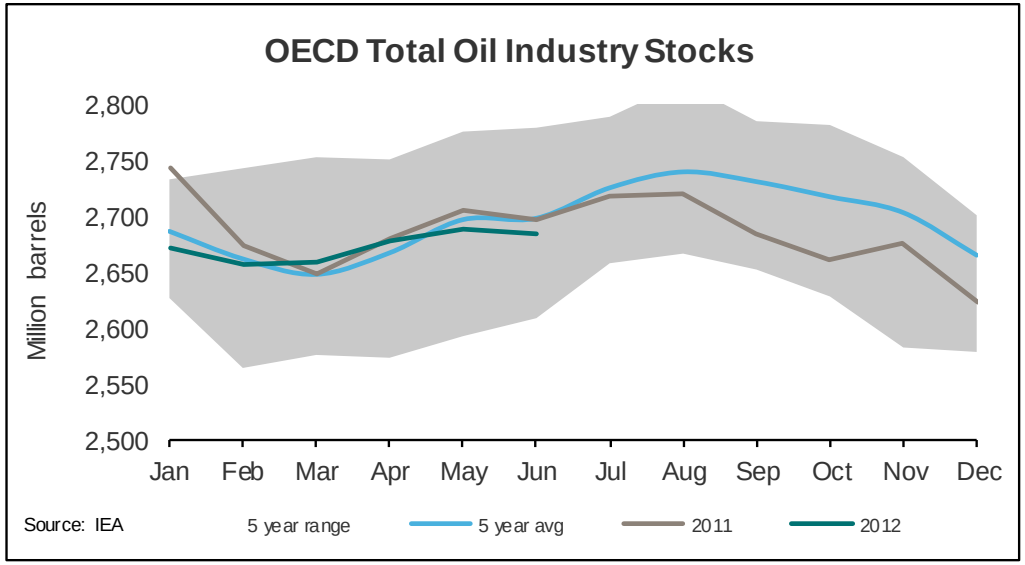
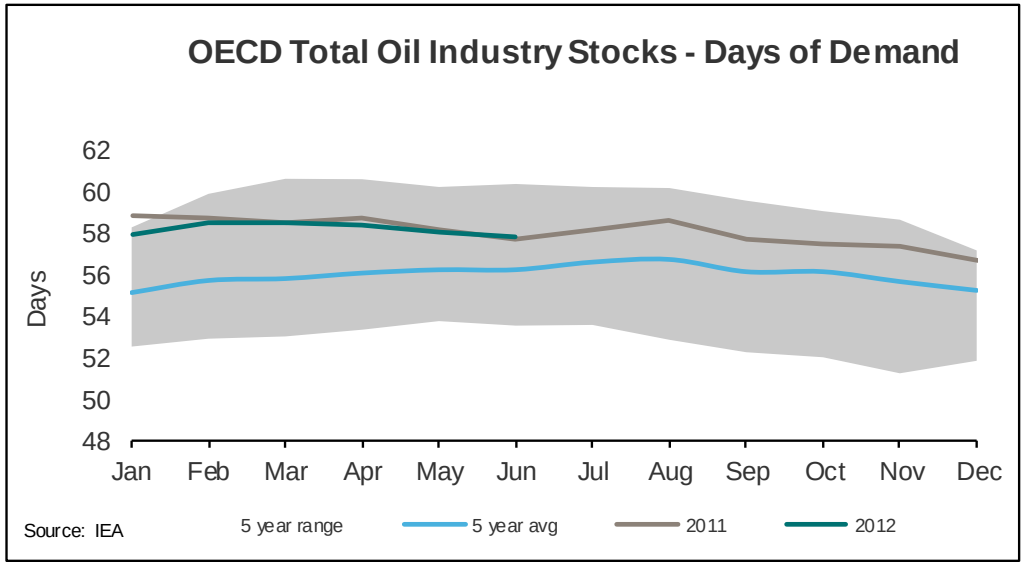
# And Frankly Stocks Should Be Measured In Days Not Barrels

- Why would OECD need to maintain the same stock level as 5 years ago when OECD demand is down 10% since 2007??







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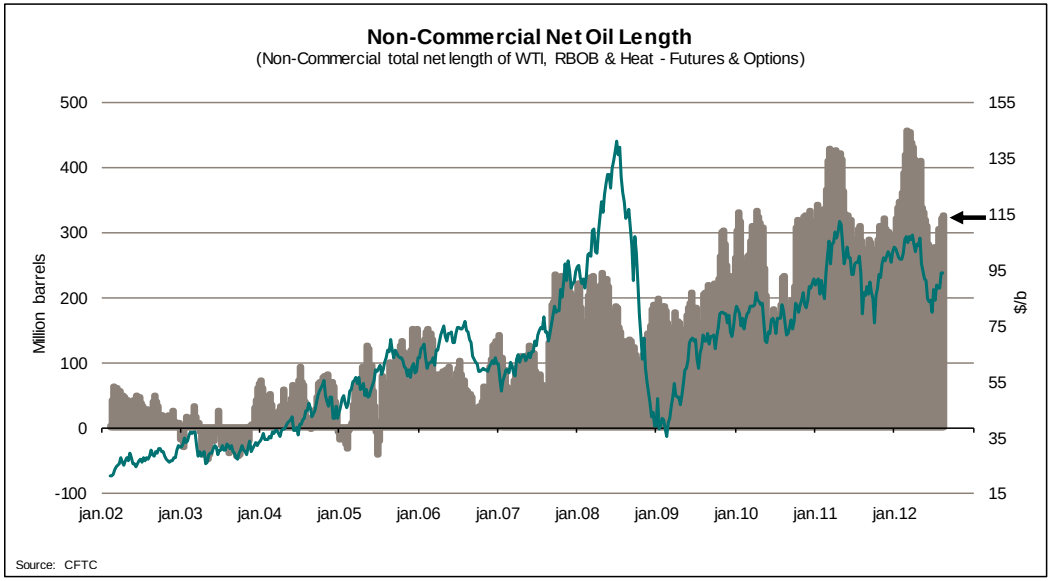
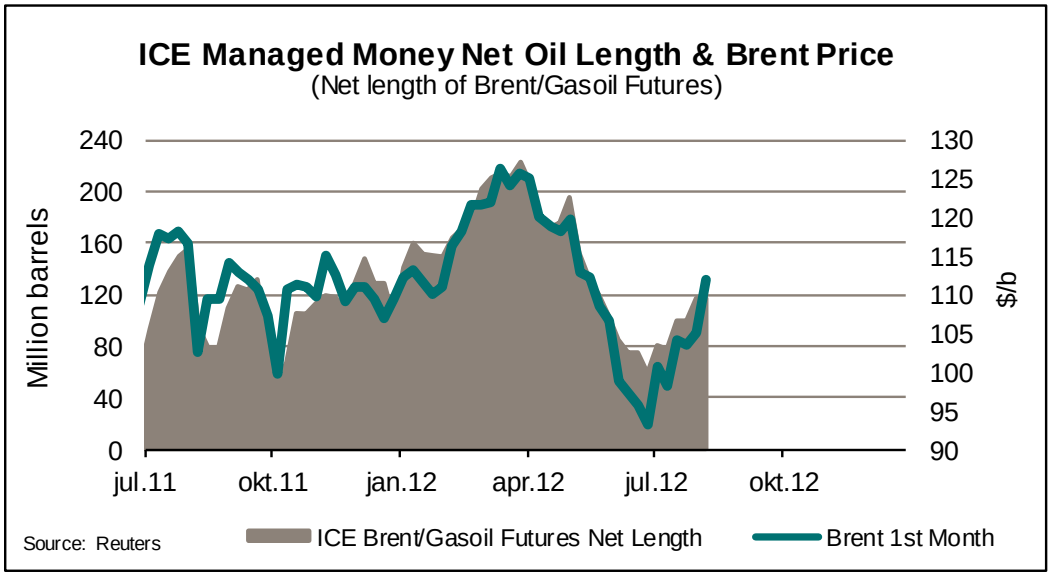
# Financial Oil Positions Were Sold Off In May/June

- But are now being rebuilt







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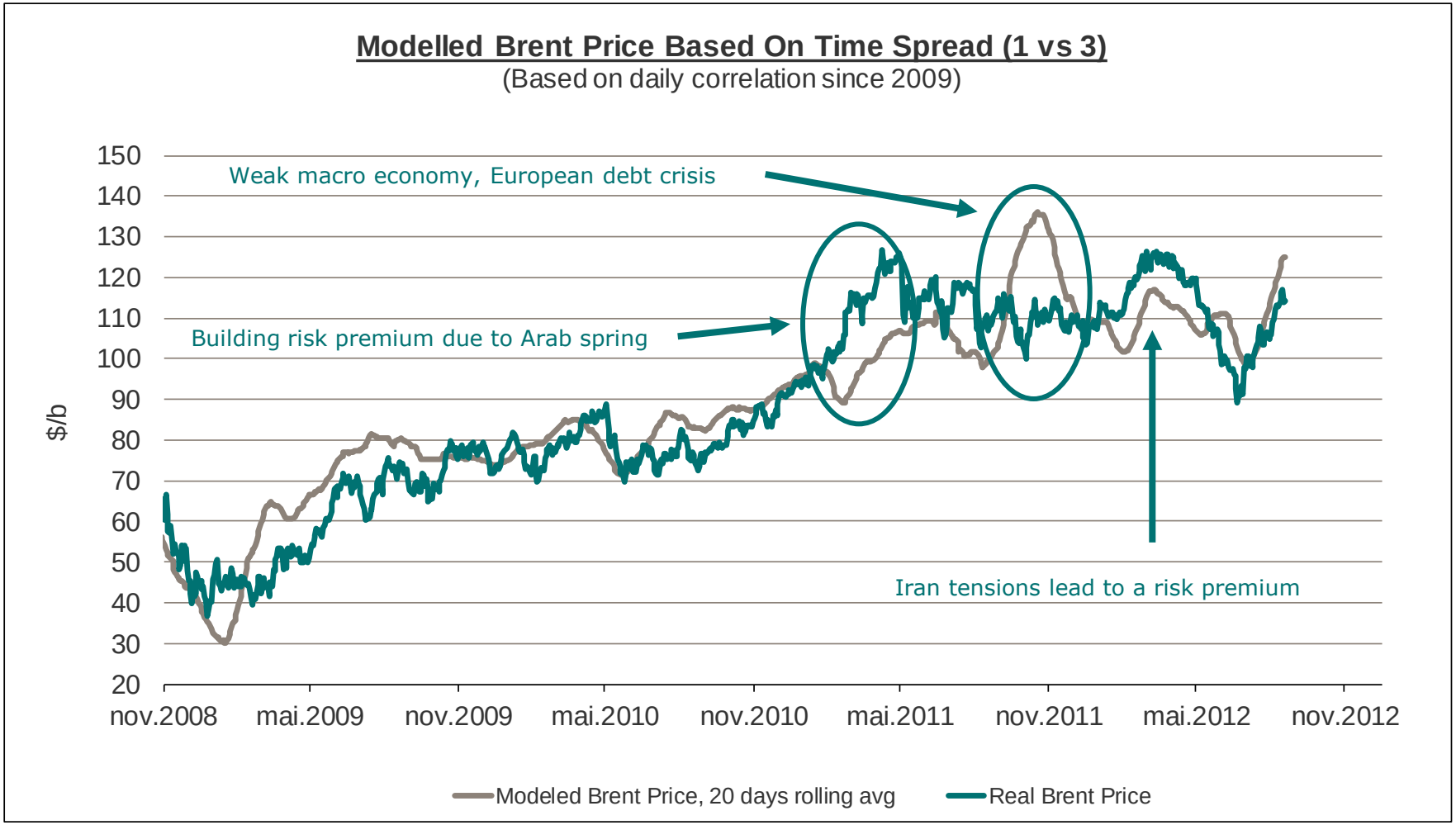
# Modeled Brent Price Based On Time Spread

- Has provided early market signals several times. Right now the Brent market is very tight (large backwardation) suggesting the oil price should be even higher based on the model.

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# Fundamental Balances DNB Markets vs IEA, OPEC, EIA

| DNB Markets World Oil Supply-Demand Balance: | 2008 | Change | 2009 | Change | 2010 | Change | 2011 | Change | 2012 | Change | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OECD Demand | 48.1 | -2.0 | 46.1 | 0.6 | 46.6 | -0.6 | 46.1 | -0.3 | 45.7 | -0.5 | 45.2 |
| Non-OECD Demand | 37.7 | 1.2 | 38.9 | 2.2 | 41.1 | 1.2 | 42.3 | 1.1 | 43.5 | 1.0 | 44.5 |
| **Total Demand** | **85.8** | **-0.8** | **85.0** | **2.8** | **87.8** | **0.6** | **88.4** | **0.8** | **89.2** | **0.5** | **89.7** |
| | | | | | | | | | | | |
| Non-OPEC Supply | 49.2 | 0.7 | 49.9 | 1.0 | 50.8 | 0.1 | 50.9 | 0.5 | 51.4 | 0.9 | 52.3 |
| OPEC NGL's and non-conventional oil | 4.5 | 0.4 | 4.9 | 0.5 | 5.4 | 0.4 | 5.8 | 0.4 | 6.2 | 0.3 | 6.5 |
| Global Biofuels | 1.4 | 0.2 | 1.6 | 0.2 | 1.8 | 0.0 | 1.9 | 0.0 | 1.9 | 0.1 | 2.0 |
| **Total Non-OPEC supply** | **55.1** | **1.2** | **56.3** | **1.7** | **58.0** | **0.5** | **58.6** | **0.9** | **59.5** | **1.3** | **60.8** |
| | | | | | | | | | | | |
| **Call on OPEC crude (and stocks)** | **30.7** | **-2.0** | **28.7** | **1.1** | **29.7** | **0.1** | **29.8** | **-0.1** | **29.7** | **-0.8** | **28.9** |
| OPEC Crude Oil Supply (Last known number dragged fwd) | 31.6 | -2.5 | 29.1 | 0.1 | 29.2 | 0.6 | 29.9 | 1.6 | 31.5 | -0.1 | 31.4 |
| **Implied World Oil Stock Change** | **0.9** | | **0.4** | | **-0.5** | | **0.0** | | **1.7** | | **2.5** |

| IEA World Oil Supply-Demand Balance (Aug 2012): | 2008 | Change | 2009 | Change | 2010 | Change | 2011 | Change | 2012 | Change | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OECD Demand | 48.4 | -2.0 | 46.4 | 0.6 | 46.9 | -0.5 | 46.4 | -0.3 | 46.1 | -0.3 | 45.8 |
| Non-OECD Demand | 38.1 | 1.0 | 39.1 | 2.1 | 41.2 | 1.2 | 42.4 | 1.2 | 43.5 | 1.2 | 44.7 |
| **Total Demand** | **86.5** | **-1.0** | **85.5** | **2.7** | **88.1** | **0.7** | **88.8** | **0.9** | **89.6** | **0.8** | **90.5** |
| | | | | | | | | | | | |
| Non-OPEC Supply | 49.2 | 0.7 | 49.9 | 1.0 | 50.8 | 0.1 | 50.9 | 0.4 | 51.3 | 0.5 | 51.9 |
| OPEC NGL's and non-conventional oil | 4.5 | 0.4 | 4.9 | 0.5 | 5.4 | 0.4 | 5.8 | 0.4 | 6.2 | 0.3 | 6.5 |
| Global Biofuels | 1.4 | 0.2 | 1.6 | 0.2 | 1.8 | 0.0 | 1.9 | 0.0 | 1.9 | 0.2 | 2.0 |
| **Total Non-OPEC supply** | **55.1** | **1.2** | **56.3** | **1.7** | **58.0** | **0.5** | **58.6** | **0.9** | **59.4** | **1.0** | **60.4** |
| | | | | | | | | | | | |
| **Call on OPEC crude (and stocks)** | **31.4** | **-2.2** | **29.1** | **1.0** | **30.1** | **0.1** | **30.2** | **0.0** | **30.2** | **-0.1** | **30.1** |
| OPEC Crude Oil Supply (Last known number dragged fwd) | 31.6 | -2.5 | 29.1 | 0.1 | 29.2 | 0.6 | 29.9 | 1.6 | 31.5 | -0.1 | 31.4 |
| **Implied World Oil Stock Change** | **0.2** | | **0.0** | | **-0.9** | | **-0.3** | | **1.2** | | **1.3** |

| OPEC World Oil Supply-Demand Balance (Aug 2012): | 2008 | Change | 2009 | Change | 2010 | Change | 2011 | Change | 2012 | Change | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OECD Demand | 47.6 | -1.9 | 45.7 | 0.5 | 46.2 | -0.5 | 45.7 | -0.2 | 45.5 | -0.2 | 45.3 |
| Non-OECD Demand | 38.5 | 0.6 | 39.1 | 1.7 | 40.8 | 1.3 | 42.1 | 1.1 | 43.2 | 1.0 | 44.2 |
| **Total Demand** | **86.1** | **-1.3** | **84.8** | **2.2** | **87.0** | **0.8** | **87.8** | **0.9** | **88.7** | **0.8** | **89.5** |
| | | | | | | | | | | | |
| Non-OPEC Supply (Incl all Biofuel) | 50.3 | 0.8 | 51.1 | 1.2 | 52.3 | 0.2 | 52.5 | 0.7 | 53.2 | 0.9 | 54.1 |
| OPEC NGL's and non-conventional oil | 4.1 | 0.2 | 4.3 | 0.7 | 5.0 | 0.3 | 5.3 | 0.4 | 5.7 | 0.2 | 5.9 |
| **Total Non-OPEC supply** | **54.4** | **1.0** | **55.4** | **1.9** | **57.3** | **0.5** | **57.8** | **1.1** | **58.9** | **1.1** | **60.0** |
| | | | | | | | | | | | |
| **Call on OPEC crude (and stocks)** | **31.7** | **-2.3** | **29.4** | **0.3** | **29.7** | **0.3** | **30.0** | **-0.2** | **29.8** | **-0.3** | **29.5** |
| OPEC Crude Oil Supply (Last known number dragged fwd) | 31.2 | -2.5 | 28.7 | | 29.2 | | 29.9 | | 31.5 | | 31.4 |
| **Implied World Oil Stock Change** | **-0.5** | | **-0.7** | | **-0.5** | | **-0.1** | | **1.7** | | **1.9** |

| EIA World Oil Supply-Demand balance (Aug 2012): | 2008 | Change | 2009 | Change | 2010 | Change | 2011 | Change | 2012 | Change | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OECD Demand | 47.6 | -2.2 | 45.4 | 0.7 | 46.1 | -0.4 | 45.7 | -0.4 | 45.3 | -0.1 | 45.1 |
| Non-OECD Demand | 38.2 | 0.7 | 38.9 | 2.1 | 41.0 | 1.4 | 42.4 | 1.2 | 43.6 | 0.0 | 43.6 |
| **Total Demand** | **85.8** | **-1.5** | **84.3** | **2.7** | **87.1** | **1.0** | **88.1** | **0.8** | **88.8** | **0.9** | **89.7** |
| | | | | | | | | | | | |
| Non-OPEC Supply (Incl all Biofuel) | 49.7 | 0.8 | 50.5 | 1.3 | 51.8 | 0.2 | 52.0 | 0.6 | 52.5 | 1.3 | 53.8 |
| OPEC NGL's and non-conventional oil | 4.5 | 0.3 | 4.8 | 0.8 | 5.5 | -0.3 | 5.3 | 0.3 | 5.6 | 0.2 | 5.8 |
| **Total Non-OPEC supply** | **54.1** | **1.1** | **55.2** | **2.1** | **57.3** | **0.0** | **57.3** | **0.9** | **58.1** | **1.4** | **59.6** |
| | | | | | | | | | | | |
| **Call on OPEC crude (and stocks)** | **31.7** | **-2.6** | **29.1** | **0.7** | **29.8** | **1.1** | **30.8** | **-0.1** | **30.7** | **-0.5** | **30.2** |
| OPEC Crude Oil Supply (Last known number dragged fwd) | 31.3 | -2.2 | 29.1 | 0.1 | 29.2 | 0.6 | 29.9 | 1.6 | 31.5 | -0.1 | 31.4 |
| **Implied World Oil Stock Change** | **-0.4** | | **0.0** | | **-0.5** | | **-0.9** | | **0.8** | | **1.2** |

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# DNB Global Oil Demand Assumptions For 2012

| Year-on-Year Demand Change (kbd) | Q1-12 | Q2-12 | Q3-12 | Q4-12 | 2012 |
|---|---|---|---|---|---|
| North America (Canada, Mexico) | -89 | 65 | -73 | -85 | -45 |
| US | -662 | -72 | 48 | -100 | -196 |
| Europe | -456 | -357 | -511 | -432 | -439 |
| Australia, New Zealand, Japan, Korea | 422 | 588 | 219 | 204 | 358 |
| **Total OECD** | **-784** | **224** | **-317** | **-414** | **-322** |
| | | | | | |
| Europe/Africa Med & FSU | 247 | 273 | 250 | 199 | 242 |
| Middle East AG excl. Iran and Saudi | 132 | 114 | 113 | 116 | 119 |
| Iran | -3 | 24 | -56 | -48 | -21 |
| Saudi Arabia | 94 | 124 | 99 | 138 | 114 |
| Asia Pacific/East Africa excl. China and India | 69 | 192 | 182 | 133 | 144 |
| China | 260 | 116 | 329 | 274 | 245 |
| India | 130 | 137 | 95 | 45 | 102 |
| West Africa | 92 | 36 | 26 | 30 | 46 |
| Latin America (excl. Mexico) | 205 | 163 | 121 | 123 | 153 |
| **Total Non-OECD** | **1,226** | **1,179** | **1,159** | **1,008** | **1,143** |
| | | | | | |
| North America | -750 | -7 | -24 | -185 | -242 |
| Europe/Africa Med & FSU | -209 | -84 | -261 | -233 | -197 |
| Middle East AG/Asia Pacific/East Africa | 1,104 | 1,296 | 980 | 860 | 1,060 |
| Middle East AG | 223 | 262 | 156 | 205 | 211 |
| Asia Pacific/East Africa | 881 | 1,034 | 824 | 655 | 849 |
| West Africa | 92 | 36 | 26 | 30 | 46 |
| Latin America (excl. Mexico) | 205 | 163 | 121 | 123 | 153 |
| **Total World** | **442** | **1,404** | **842** | **595** | **821** |

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# DNB Global Oil Demand Assumptions For 2013

| Year-on-Year Demand Change (kbd) | Q1-13 | Q2-13 | Q3-13 | Q4-13 | 2013 |
|---|---|---|---|---|---|
| North America (Canada, Mexico) | -11 | -29 | -49 | -45 | -33 |
| US | -100 | -100 | -100 | -100 | -100 |
| Europe | -374 | -408 | -450 | -391 | -406 |
| Australia, New Zealand, Japan, Korea | -49 | 112 | -4 | 0 | 15 |
| **Total OECD** | **-534** | **-425** | **-603** | **-535** | **-524** |
| | | | | | |
| Europe/Africa Med & FSU | 246 | 231 | 208 | 220 | 226 |
| Middle East AG excl. Iran and Saudi | 120 | 126 | 92 | 117 | 114 |
| Iran | -62 | -64 | -41 | -50 | -54 |
| Saudi Arabia | 171 | 110 | 82 | 127 | 122 |
| Asia Pacific/East Africa excl. China and India | 173 | 153 | 180 | 156 | 166 |
| China | 400 | 314 | 168 | 51 | 233 |
| India | 74 | 21 | 125 | 64 | 71 |
| West Africa | 18 | 27 | 28 | 28 | 25 |
| Latin America (excl. Mexico) | 156 | 130 | 105 | 127 | 130 |
| **Total Non-OECD** | **1,296** | **1,049** | **948** | **840** | **1,033** |
| | | | | | |
| North America | -111 | -129 | -149 | -145 | -133 |
| Europe/Africa Med & FSU | -129 | -176 | -242 | -171 | -179 |
| Middle East AG/Asia Pacific/East Africa | 827 | 772 | 602 | 465 | 667 |
| Middle East AG | 229 | 172 | 134 | 194 | 182 |
| Asia Pacific/East Africa | 598 | 600 | 469 | 271 | 485 |
| West Africa | 18 | 27 | 28 | 28 | 25 |
| Latin America (excl. Mexico) | 156 | 130 | 105 | 127 | 130 |
| **Total World** | **762** | **623** | **345** | **305** | **509** |

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# DNB Global Oil Demand – Historical's & Assumptions

| Demand change in Million b/d | Change 2008 | Change 2009 | Change 2010 | Change 2011 | YoY Last 3 mts | 2012 YTD Chg: | Change 2012 | Change 2013 |
|---|---|---|---|---|---|---|---|---|
| North America (Canada, Mexico) | -70 | -163 | 95 | 74 | 6 | -19 | -45 | -33 |
| US | -1,188 | -725 | 407 | -343 | 137 | -265 | -196 | -100 |
| Europe | -93 | -755 | -23 | -322 | -318 | -391 | -439 | -406 |
| Australia, New Zealand, Japan, Korea | -311 | -365 | 83 | 28 | 487 | 466 | 358 | 15 |
| **Total OECD** | **-1,662** | **-2,008** | **562** | **-562** | **313** | **-208** | **-322** | **-524** |
| | | | | | | | | |
| Europe/Africa Med & FSU | 310 | -173 | 130 | 174 | 276 | 263 | 242 | 226 |
| Middle East AG excl. Iran and Saudi | 157 | 151 | 134 | -21 | 124 | 126 | 119 | 114 |
| Iran | 45 | 59 | -177 | -38 | -5 | 0 | -21 | -54 |
| Saudi Arabia | 135 | 223 | 221 | 115 | 140 | 118 | 114 | 122 |
| Asia Pacific/East Africa excl. China and India | -171 | 387 | 348 | 98 | 177 | 133 | 144 | 166 |
| China | 328 | 450 | 956 | 504 | 220 | 187 | 245 | 233 |
| India | 121 | 36 | 224 | 137 | 107 | 121 | 102 | 71 |
| West Africa | 79 | 4 | 46 | 28 | 32 | 58 | 46 | 25 |
| Latin America (excl. Mexico) | 316 | 65 | 316 | 211 | 155 | 178 | 153 | 130 |
| **Total Non-OECD** | **1,319** | **1,199** | **2,196** | **1,209** | **1,226** | **1,185** | **1,143** | **1,033** |
| | | | | | | | | |
| North America | -1,257 | -888 | 502 | -268 | 144 | -284 | -242 | -133 |
| Europe/Africa Med & FSU | 218 | -929 | 107 | -148 | -42 | -128 | -197 | -179 |
| Middle East AG/Asia Pacific/East Africa | 302 | 940 | 1,788 | 824 | 1,250 | 1,152 | 1,060 | 667 |
| Middle East AG | 336 | 433 | 177 | 57 | 259 | 244 | 211 | 182 |
| Asia Pacific/East Africa | -34 | 507 | 1,611 | 767 | 991 | 908 | 849 | 485 |
| West Africa | 79 | 4 | 46 | 28 | 32 | 58 | 46 | 25 |
| Latin America (excl. Mexico) | 316 | 65 | 316 | 211 | 155 | 178 | 153 | 130 |
| **Total World** | **-343** | **-809** | **2,758** | **647** | **1,539** | **976** | **821** | **509** |

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# Selected Non-OPEC Supply Historical's & Assumptions

| DNB Year on Year Non-OPEC Output | Q1-2010 | Q2-2010 | Q3-2010 | Q4-2010 | Q1-2011 | Q2-2011 | Q3-2011 | Q4-2011 | Q1-2012 | Q2-2012 | Q3-2012 | Q4-2012 | Q1-2013 | Q2-2013 | Q3-2013 | Q4-2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Canada | -12 | +223 | +137 | +261 | +221 | -57 | +222 | +221 | +308 | +481 | +214 | +173 | +203 | +190 | +174 | +201 |
| Mexico | -50 | -4 | +5 | -30 | -23 | -5 | -34 | -7 | -51 | -22 | -16 | -40 | -26 | -31 | -28 | -27 |
| Norway | -210 | -96 | -361 | -218 | -182 | -138 | +59 | -128 | -56 | -0 | -284 | -120 | -121 | -130 | -60 | -120 |
| United Kingdom | -124 | -183 | -61 | -125 | -245 | -229 | -272 | -230 | -152 | -181 | -116 | -182 | -177 | -152 | -118 | -151 |
| United States | +497 | +259 | +218 | +418 | +112 | +388 | +274 | +627 | +1,042 | +847 | +771 | +644 | +693 | +713 | +729 | +729 |
| Azerbaijan | +23 | -25 | -8 | -24 | -22 | -109 | -140 | -200 | -71 | -20 | -4 | +27 | -19 | -2 | -7 | +11 |
| Kazakhstan | +126 | +55 | +25 | +32 | +53 | +35 | -24 | -23 | -38 | -21 | +12 | -51 | +17 | +31 | +25 | +28 |
| Russia | +339 | +271 | +182 | +180 | +141 | +137 | +148 | +147 | +174 | +112 | +45 | -0 | -12 | +6 | +4 | -7 |
| Ghana | +0 | +0 | +0 | +3 | +50 | +78 | +82 | +70 | +20 | -7 | -7 | -6 | -6 | -6 | -7 | -6 |
| South Sudan | +0 | +0 | +0 | +0 | +0 | +0 | +347 | +337 | +124 | +0 | -347 | -337 | -124 | +20 | +50 | +80 |
| Sudan | +23 | -23 | -19 | -22 | -10 | -4 | -362 | -354 | -359 | -400 | -17 | -1 | -2 | +2 | +0 | -1 |
| Malaysia | +6 | +2 | -19 | +8 | -37 | -103 | -53 | -38 | -4 | +53 | +16 | +12 | +12 | +16 | +13 | +16 |
| China | +221 | +224 | +276 | +371 | +235 | +124 | -72 | -191 | -21 | -61 | +6 | +19 | -27 | +23 | -11 | +7 |
| Brazil | +104 | +140 | +100 | +110 | +81 | +28 | +35 | +78 | +82 | -53 | +12 | +24 | +14 | +31 | +24 | +19 |
| Colombia | +119 | +125 | +123 | +95 | +108 | +146 | +135 | +132 | +66 | +18 | -1 | -7 | -2 | -4 | +1 | -4 |
| Oman | +69 | +60 | +35 | +46 | +33 | +16 | +35 | +13 | +2 | +37 | +28 | +39 | +36 | +40 | +39 | +41 |
| Syria | -16 | -16 | -16 | -16 | +0 | -2 | -38 | -191 | -214 | -221 | -141 | -53 | -17 | +1 | -6 | +5 |
| Yemen | -18 | -16 | -14 | -13 | +4 | -99 | -48 | -105 | -159 | -11 | -26 | -13 | +1 | -20 | -20 | -10 |
| Global Biofuels | +249 | +320 | +351 | +38 | +95 | -31 | +41 | +29 | +63 | -114 | +41 | +114 | +97 | +105 | +73 | +98 |
| **Non-OPEC (including processing gains)** | **+1,223** | **+1,409** | **+1,050** | **+1,128** | **+583** | **-167** | **+83** | **+56** | **+700** | **+547** | **+294** | **+419** | **+722** | **+1,054** | **+1,118** | **+1,198** |

| Liquids Supply | Change 2007 | Change 2008 | Change 2009 | Change 2010 | Change 2011 | 2012 YTD Change | Change 2012 | Change 2013 |
|---|---|---|---|---|---|---|---|---|
| Canada | 114 | -72 | -26 | 152 | 152 | 382 | 294 | 192 |
| Mexico | -210 | -315 | -186 | -20 | -17 | -32 | -32 | -28 |
| Norway | -221 | -86 | -107 | -221 | -97 | -80 | -115 | -108 |
| United Kingdom | 0 | -96 | -88 | -123 | -244 | -166 | -158 | -150 |
| United States | 15 | -121 | 513 | 348 | 351 | 946 | 826 | 716 |
| Azerbaijan | 212 | 44 | 144 | -9 | -118 | -34 | -17 | -4 |
| Kazakhstan | 58 | 24 | 133 | 60 | 11 | -3 | -25 | 25 |
| Russia | 236 | -73 | 196 | 243 | 143 | 135 | 83 | -2 |
| Ghana | 0 | 0 | 0 | 1 | 70 | 5 | 0 | -6 |
| South Sudan | 0 | 0 | 0 | 0 | 171 | 4 | -140 | 7 |
| Sudan | 132 | -15 | 14 | -10 | -183 | -333 | -194 | 0 |
| Malaysia | 4 | -3 | -37 | -1 | -58 | 25 | 19 | 14 |
| China | 33 | 72 | -7 | 273 | 24 | -33 | -14 | -2 |
| Brazil | 29 | 62 | 129 | 113 | 56 | 10 | 16 | 22 |
| Colombia | 2 | 58 | 81 | 116 | 130 | 35 | 19 | -3 |
| Oman | -27 | 47 | 55 | 53 | 24 | 19 | 26 | 39 |
| Syria | -17 | 2 | -5 | -16 | -58 | -215 | -157 | -4 |
| Yemen | -46 | -26 | -9 | -15 | -62 | -76 | -52 | -12 |
| **Sum:** | **313** | **-499** | **800** | **944** | **294** | **826** | **379** | **696** |

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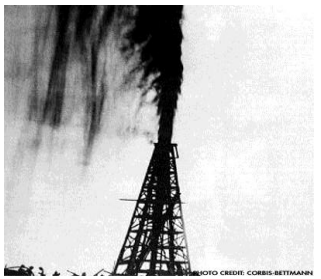


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