



Credit Suisse Global Energy Research Team

New York Energy Forum: Why We See Fundamentals Turn

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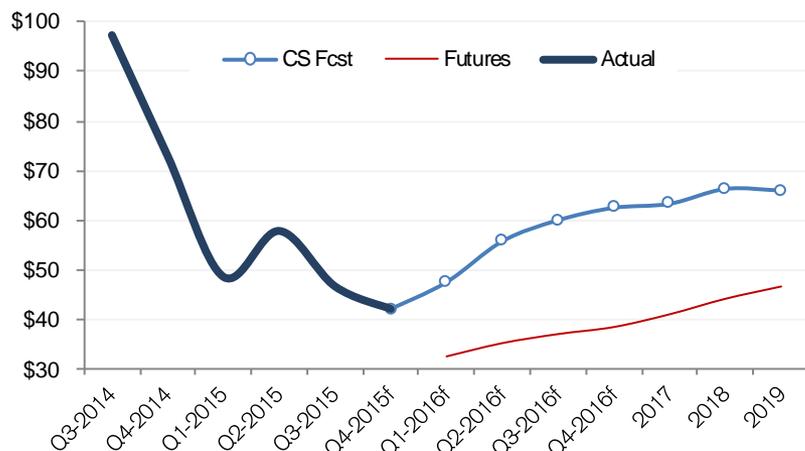
Oil Macro



CS Oil Price Forecast: “Oi’l Be Back”?

The drawn out rebalancing of s/d fundamentals should run its course in 2016

Our forecast, quarter-average WTI oil prices through 2016 and annual averages for 2017-'19, plotted from Q4-2015 actuals and history back to the middle of last year contrasted with WTI futures (\$ per barrel)



Brent			WTI			WTI - Brent		
Period	Actuals & CS	Futures	Period	Actuals & CS	Futures	Period	Actuals & CS	Futures
2011	\$ 110.91		2011	\$ 95.11		2011	\$ (15.80)	
2012	\$ 111.68		2012	\$ 94.15		2012	\$ (17.53)	
2013	\$ 108.70		2013	\$ 98.05		2013	\$ (10.65)	
2014	\$ 99.38		2014	\$ 92.89		2014	\$ (6.49)	
Q1-2015	\$ 55.13		Q1-2015	\$ 48.57		Q1-2015	\$ (6.56)	
Q2-2015	\$ 63.37		Q2-2015	\$ 57.84		Q2-2015	\$ (5.53)	
Q3-2015	\$ 51.30		Q3-2015	\$ 46.65		Q3-2015	\$ (4.65)	
Q4-2015	\$ 44.59		Q4-2015	\$ 42.11		Q4-2015	\$ (2.48)	
2015	\$ 53.60		2015	\$ 48.79		2015	\$ (4.81)	
Q1-2016f	\$ 51.00	\$ 31.89	Q1-2016f	\$ 47.50	\$ 32.52	Q1-2016f	\$ (3.50)	\$ 0.63
Q2-2016f	\$ 57.00	\$ 34.19	Q2-2016f	\$ 55.75	\$ 35.20	Q2-2016f	\$ (1.25)	\$ 1.01
Q3-2016f	\$ 60.00	\$ 36.14	Q3-2016f	\$ 60.00	\$ 37.03	Q3-2016f	\$ -	\$ 0.89
Q4-2016f	\$ 64.00	\$ 37.89	Q4-2016f	\$ 62.50	\$ 38.45	Q4-2016f	\$ (1.50)	\$ 0.56
2016f	\$ 58.00	\$ 35.03	2016f	\$ 56.44	\$ 35.80	2016f	\$ (1.56)	\$ 0.77
2017f	\$ 65.00	\$ 41.12	2017f	\$ 63.31	\$ 41.02	2017f	\$ (1.69)	\$ (0.10)
2018f	\$ 70.00	\$ 45.15	2018f	\$ 66.31	\$ 44.15	2018f	\$ (3.69)	\$ (1.00)
2019f	\$ 70.00	\$ 48.00	2019f	\$ 66.00	\$ 46.63	2019f	\$ (4.00)	\$ (1.37)
Long-Term	\$ 75.00		Long-Term	\$ 71.00		Long-Term	\$ (4.00)	

Oil Markets at Early 2016: Harrowing Declines

Benchmarks break through \$30, hitting multi-year lows

Bearish US inventory data, global macro worries, and impending crude exports from Iran have weighed on price

What happened:

Both WTI and Brent benchmarks set new lows recently. The back end of futures curve did as well, and even more so.

Drivers: all along 2015 it's been one part fundamental ...

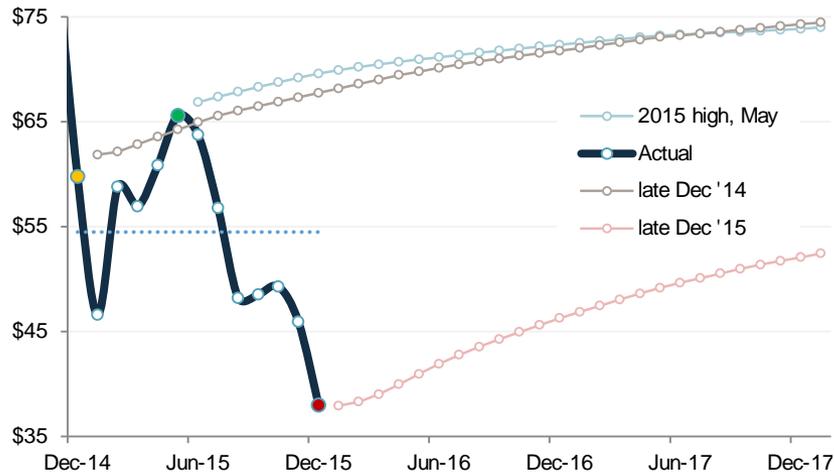
- Greater supply from Opec and resilient non-Opec production, outweighed stronger 2015 oil demand growth

... One part financial

- Speculative-flows, including many new sellers, play(ed) a large role
 - To date, no part of this year's price collapse has been about 'capitulation' of long held length

A manifest reset of expectations is new, as are the LT- new lows

Prompt prices (Brent, \$/b) have fallen to new lows, LT is below \$50

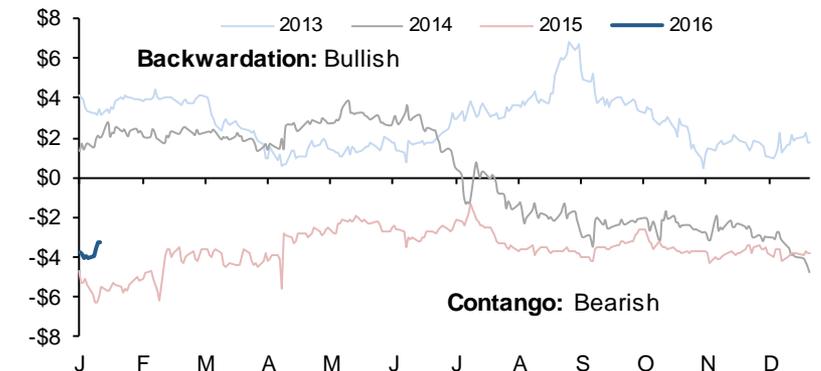


Source: Credit Suisse Research, Bloomberg

Brent prompt futures contract only barely off the lows (\$/b)



Near term fundamentals remain loose-ish Brent futures (1-6, \$/b)



\$30s to \$50s Sets Up a Rising Call on US Crude in H2-2016

How s/d fundamentals rebalance: Demand growth stays broadly healthy; US and other non-Opec roll; and Opec adds mostly from Iran

Maintaining above trend Global oil demand growth

- Received wisdom entertains a more bearish perspective on 2016 oil demand. Many are worried about proliferating signs of an industrial sector recession taking hold in late 2015. In our view, however, the American, European and key EM consumers are better off now than at any point since the GFC. And since oil demand is increasingly becoming consumer driven, we worry less about 2016 and more about 2017-'18.

Without a Recession, We Project Another Above Trend (+1.7%) Growth Year in 2016

- Similar to our view at this point last year, the critical feature remains that developed-market oil demand is tracking cyclically higher, a mini-trend that we extend into 2016

yoy, Mb/d	2015	2016	2017
Demand Growth	+1.7	+1.6	+1.5
Supply Growth	+2.3	-0.0	+1.3
Opec Supply	+0.9	+0.6	+0.9
other non-Opec	+0.7	-0.3	-0.2
Call on US Crude	+0.1	+1.3	+0.8
Actual (fcst) US Crude	+0.7	-0.3	+0.7
Actual (fcst) stock chg.	+1.7	+0.1	-0.1

The biggest change is on the supply side, since its growth goes to 0

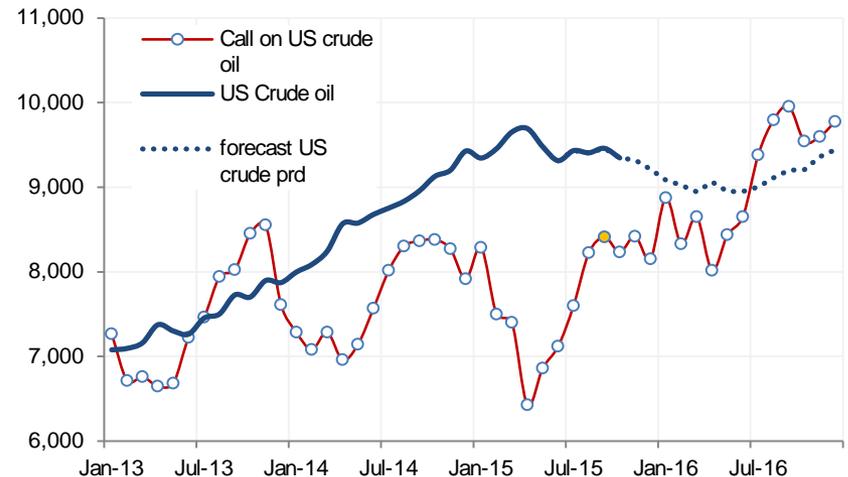
- In 2016 Opec gains share on non-Opec.
- America's decline should lead down all of non-Opec
- While within the organization, the greater gain this year comes from Iran

Across EM economies, however, the oil demand story is more diversified, and this adds up to below trend growth in 2015 and 2016.

Broadly speaking:

- Oil import economies (e.g., India, China, other SE Asia; Africa and Latin America ex Brazil and Venezuela all featured) have mostly outpaced expectations;
- Oil use is slumping in Brazil and to a lesser degree Russia. In the Mideast, oil consumption growth slipped, but for the year as a whole it held up well. Mideast demand should rise moderately in 2016 again, driven by the GCC and Iran.

From our global oil supply/demand balance, the call on US crude (kb/d)



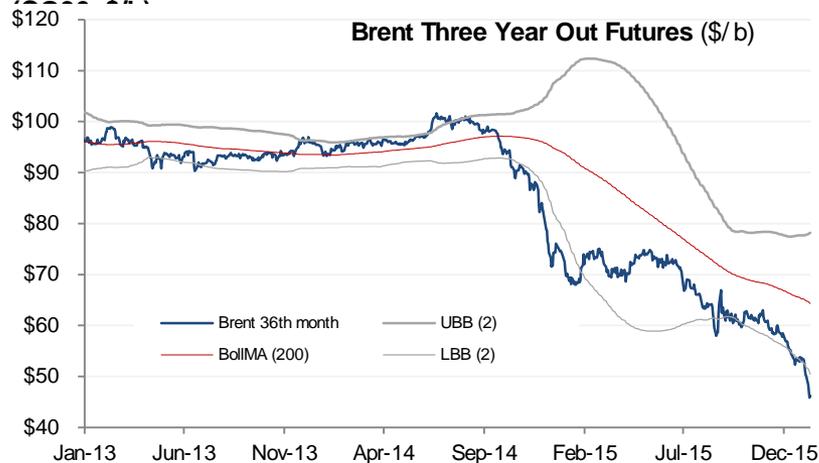
From 2017, Higher Prices Are Required to Fill the Gaps

Given declines, and assuming ongoing demand growth, the US alone cannot supply the entirety of the gap opening up between demand and supply

In the last few months' news flow, positives for the long run include:

- Demand growth in Emerging Markets
 - Growing middle classes
- Instability in the Middle East
 - Delays oil substitution with gas or renewables
- The DM cycle
 - America especially
- Upstream decline rates

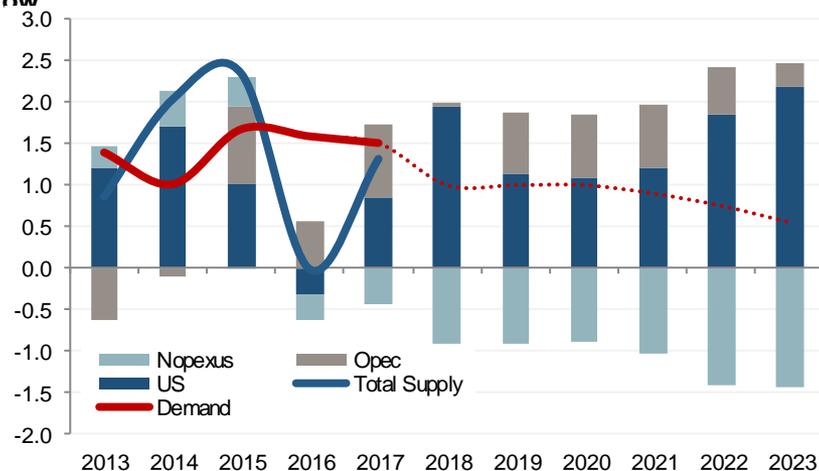
The market for long-dated Brent futures clearly shows that at the very least a debate has begun to rage about what is the replacement cost of supply later this decade — here Brent contract for month 36



On the negative side:

- Technology (upstream), substitution (renewables, gas), storage (demand), materials (lighter cars), efficiency (more people per mass of vehicle)
- Cop21, raises political headwinds for oil demand
- SA upside capacity growth potential
- Venezuela's opposition takes over parliament (leaves path risk of a disruption) but a step closer to the end goal = a more stable and profitable investment climate
- Iraq upside capacity growth, later and more dicey capacity growth potential
- The lifting of America's crude oil export ban removes the risk of congestion driven discounts of WTI crude to global markets and therefore makes investment in the US upstream that little bit less

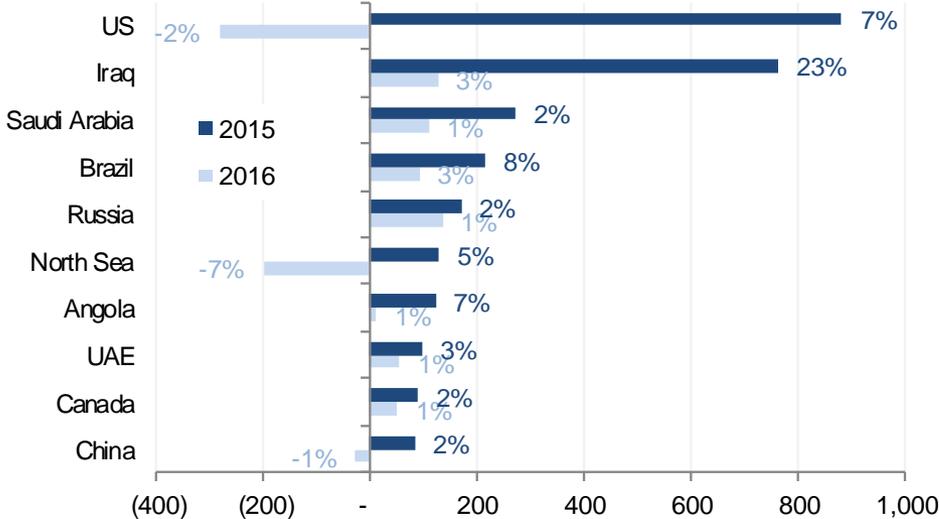
The "Call on the US": Underlying global decline of capacity of ~4 Mbbbls/d in significant reductions of capacity of Nopex. Growing Opec capacity partly offsets, but really the US has to grow



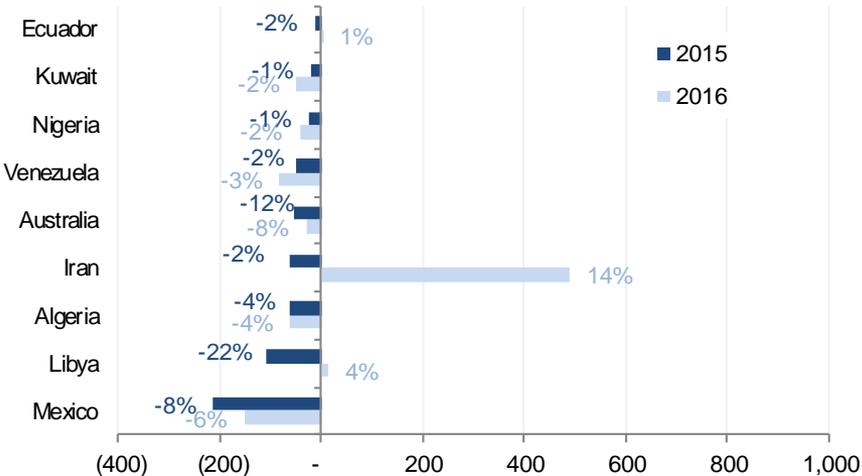
Oil Supply: Top-10 Gainers and Losers

And how those rankings change in our central scenario for 2016

Largest supply gains in 2015 and 2016 (kb/d)



Largest supply declines (kb/d)

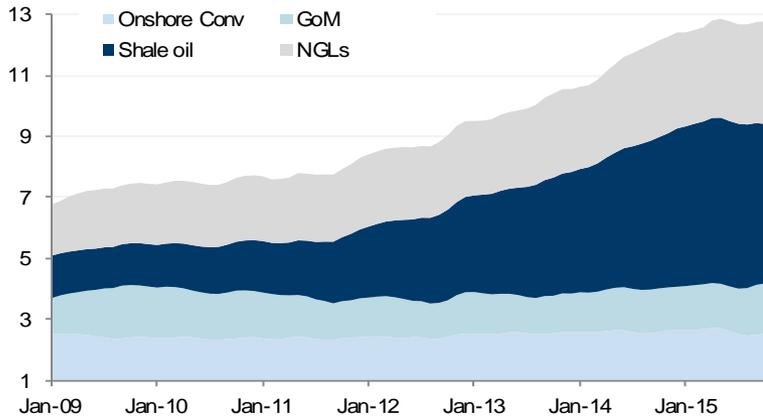


Too Slow of a US Upstream Response

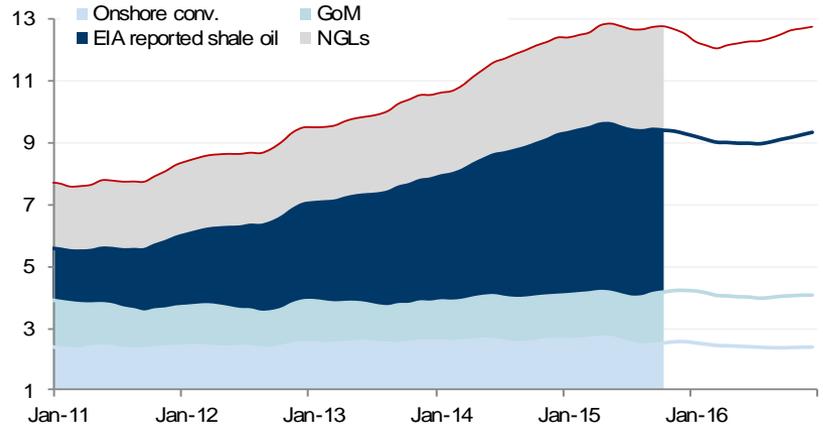
The good news: US crude oil (and NGLs) supply did begin to fall in Q2-2015

But markets will need time to become persuaded this is real. And while we are persuaded, it is still not at all clear what is the momentum or the next inflection point for US crude oil. These charts plot history and reflect our base case forecast. US crude oil production should fall 300 kb/d in 2016, after growing 700 kb/d in 2015.

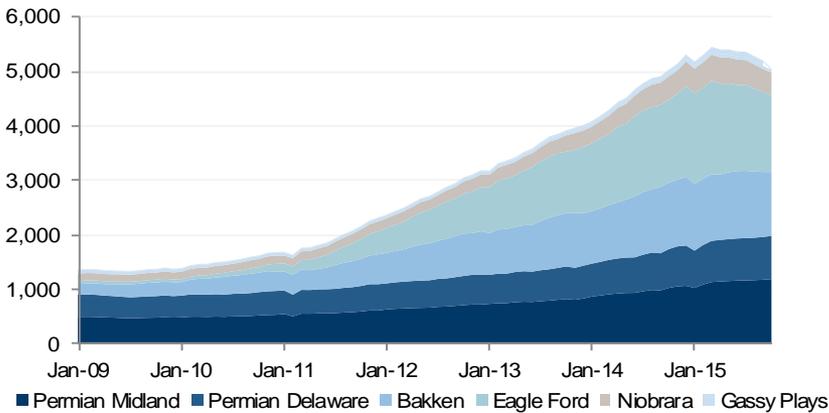
US crude oil and NGLs production began to roll over (Mb/d)



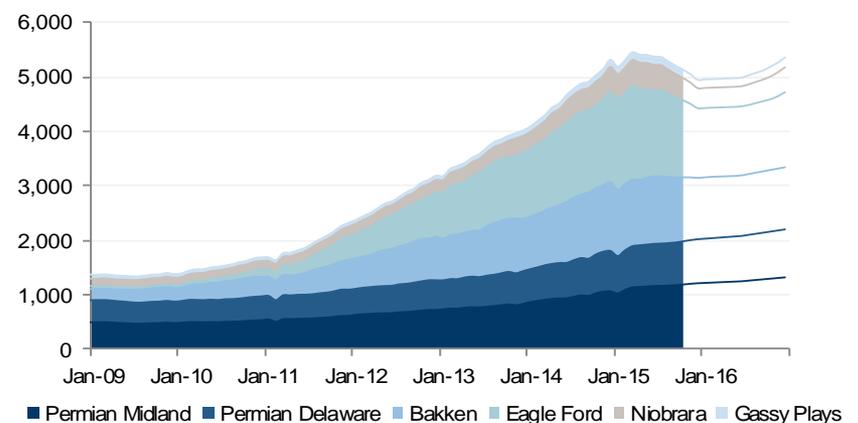
Shale production too should track lower next year, before inflecting



Within the shale universe. only the Permian is still growing (kb/d)



All others should track down well into next year



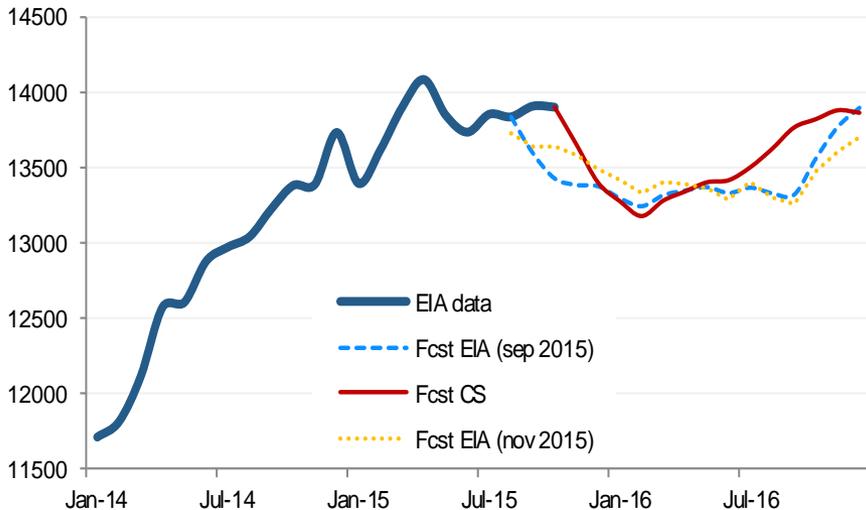
Signposts of US Oil Production

The US onshore service sector says it is in for a long and painful extension of an already long and painful ride down. And falling rig-counts are making a real difference. Better yet, the EIA's monitoring of all this has finally improved.

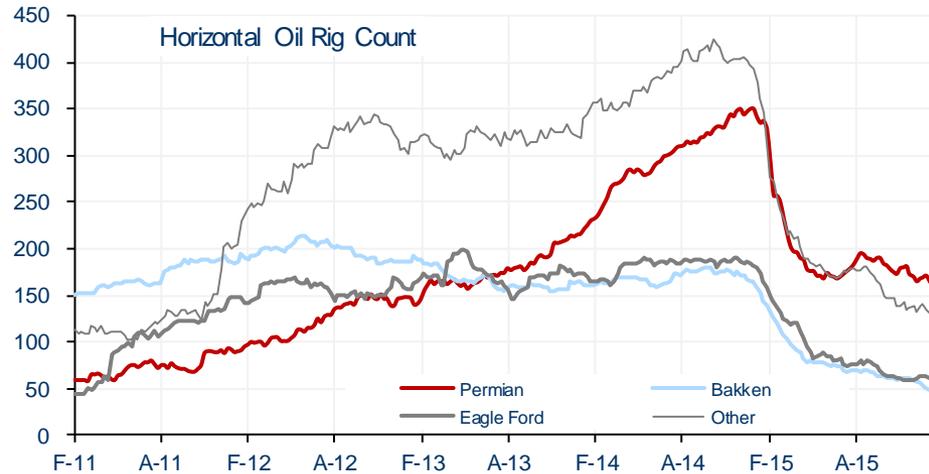
Key data points we like watching include rig counts

- In line with our prior expectations, the horizontal rig count that targets oil has begun to fall all over again
- And even the small upturn in the Permian has resumed its decline

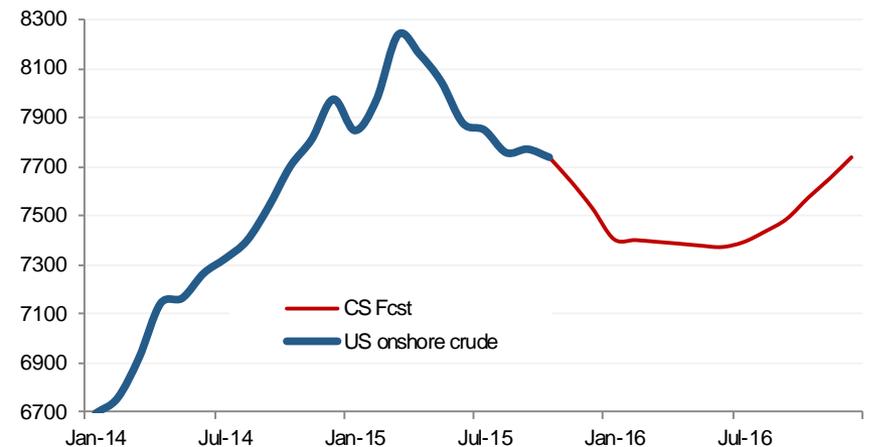
US total liquids including the GoM, data and CS + EIA forecasts (kb/d)



Horizontal oil rig counts, even the bump in the Permian deflated



Our onshore crude oil only forecast (kb/d)

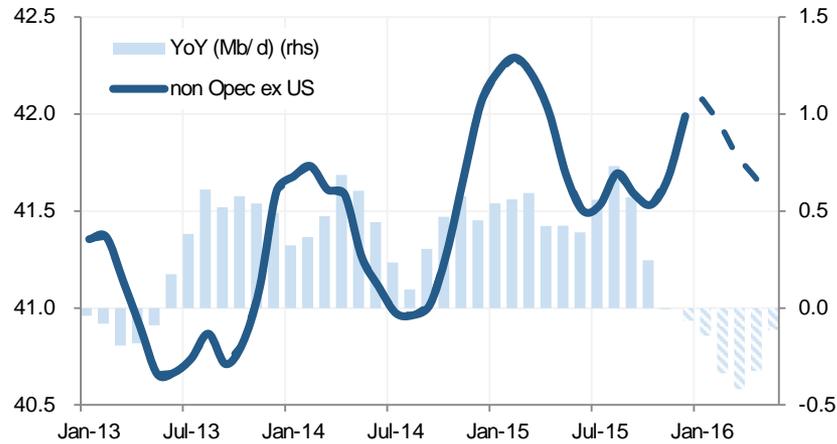


Non-Opec ex US: Resilient, but Not Impervious

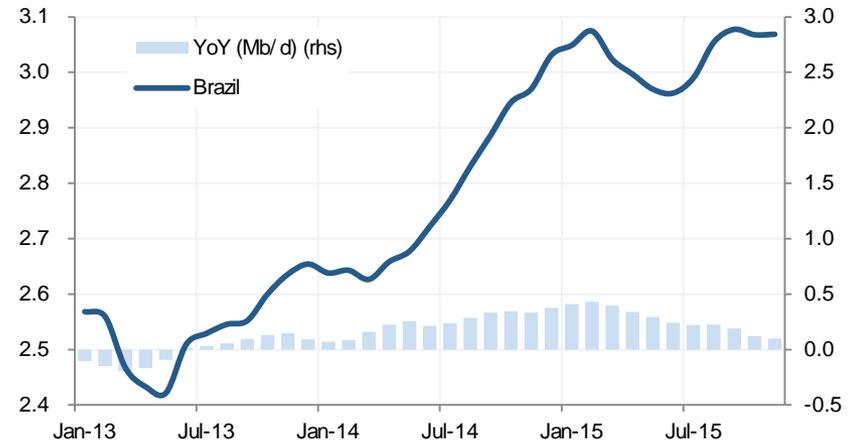
Simple charts to indicate what production is doing in key non-Opec areas

Where is the growth? Where is it not? Who is in decline? Charts of oil supply (i.e. all liquids including NGLs and biofuels) by month

Non-Opec ex US (Mb/d)



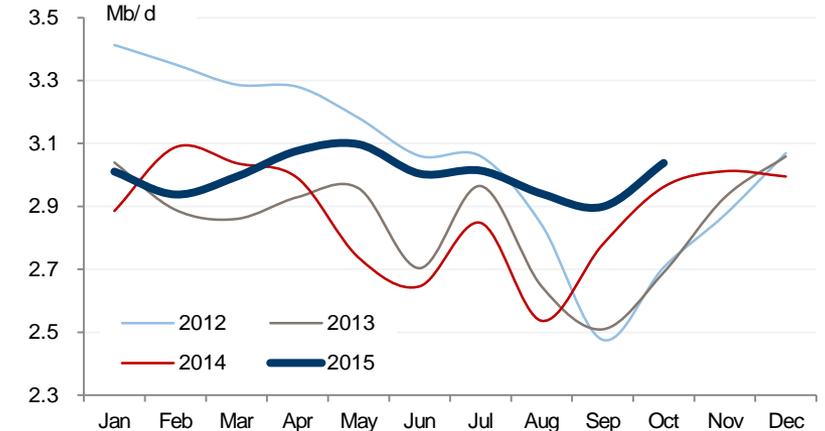
Brazil (Mb/d)



Russia (Mb/d)

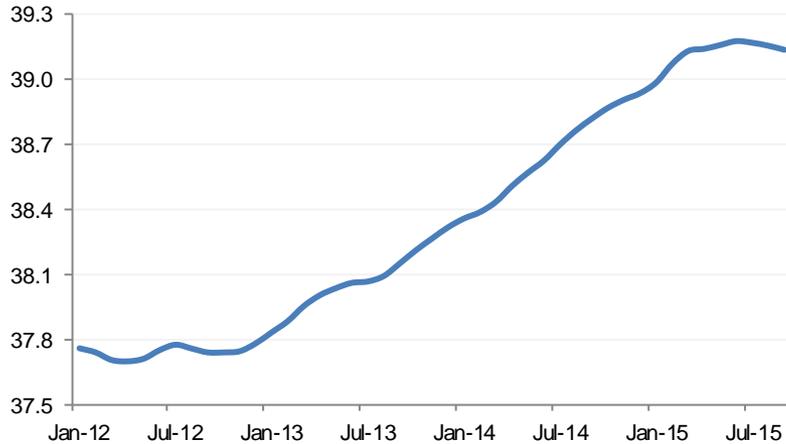


North Sea (Mb/d)



Supply Signposts: Our “Declining Production Tracker”

Non-OPEC trended decline tracker (kb/d)



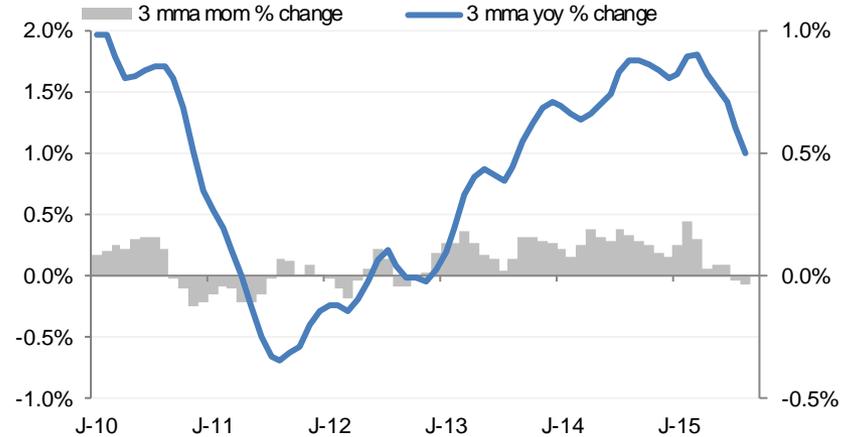
Note: Includes Russia, Mexico, China, Kazakhstan, Brazil, Canada, Azerbaijan, Norway, Colombia, Indonesia, US GoM, US conventional, UK, Egypt, Malaysia, Argentina, Thailand, Equatorial Guinea, Australia

OPEC trended decline tracker (kb/d)

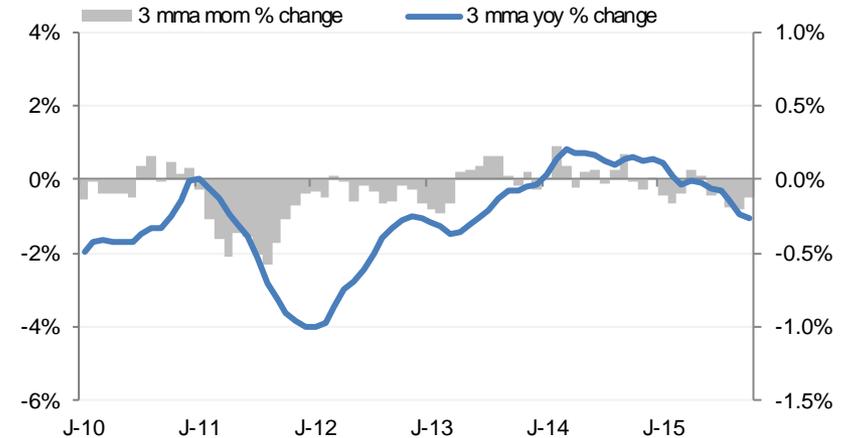


Note: Includes Angola, Nigeria, Algeria, Ecuador, Venezuela

Non-OPEC trended decline tracker (mom rhs, yoy lhs)



OPEC trended decline tracker (mom rhs, yoy lhs)

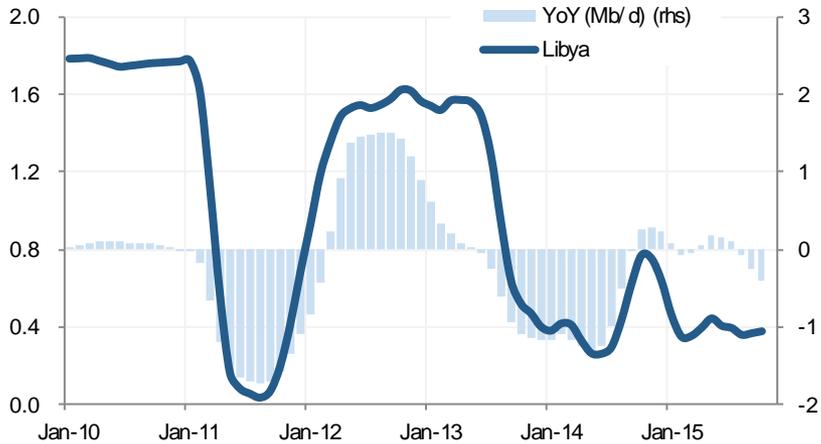


Opec: Surprises and Behavior of Key Members

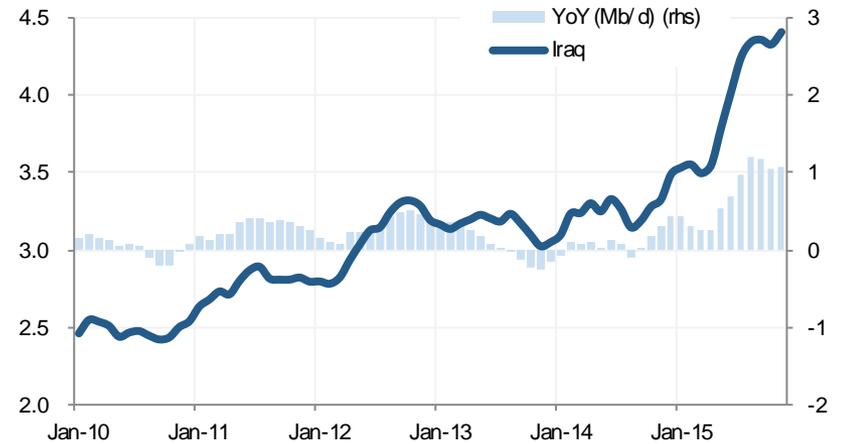
Simple charts to indicate what production is doing in key Opec categories

Where is the growth? Where is it not? Who is in decline? Charts of total oil supply, by month through November 2015

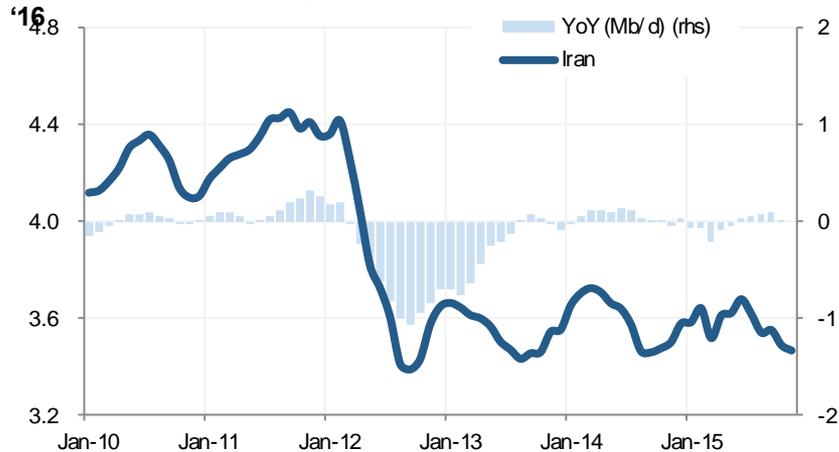
Libya has underperformed, we project a 2016 average of ~390 kb/d



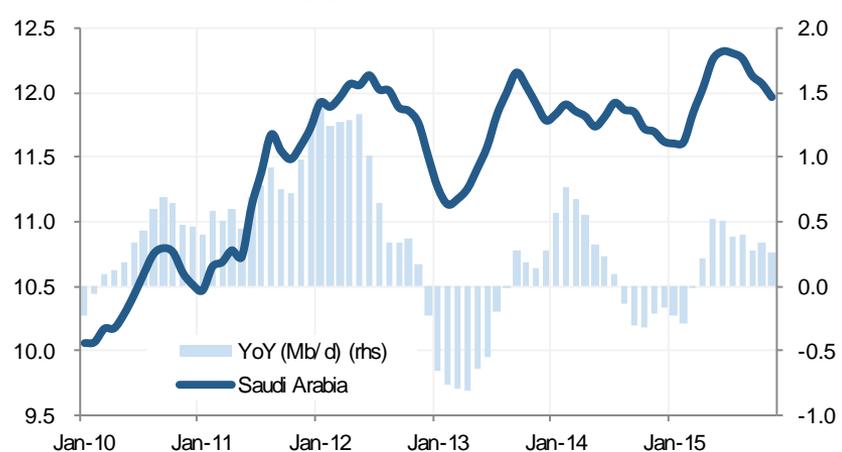
Iraq has broadly grown exports in line with our high expectations



Iran remained hamstrung by sanctions in 2015, but we add ~500 kb/d in '16



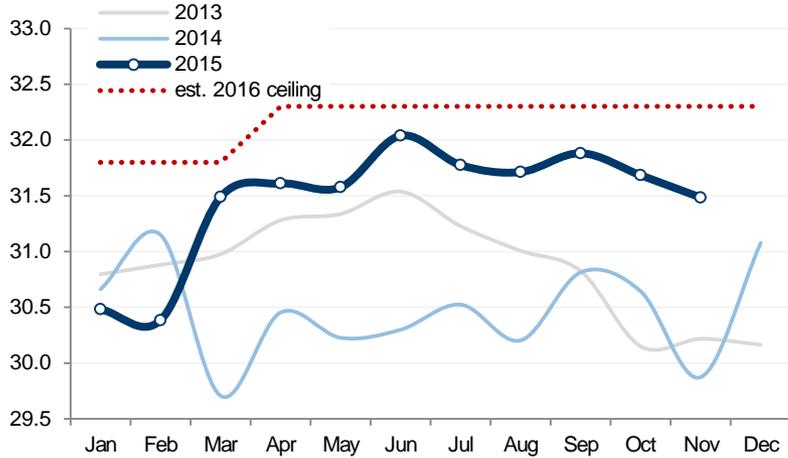
Saudi Arabia surprisingly ratcheted up to its commercial maximum



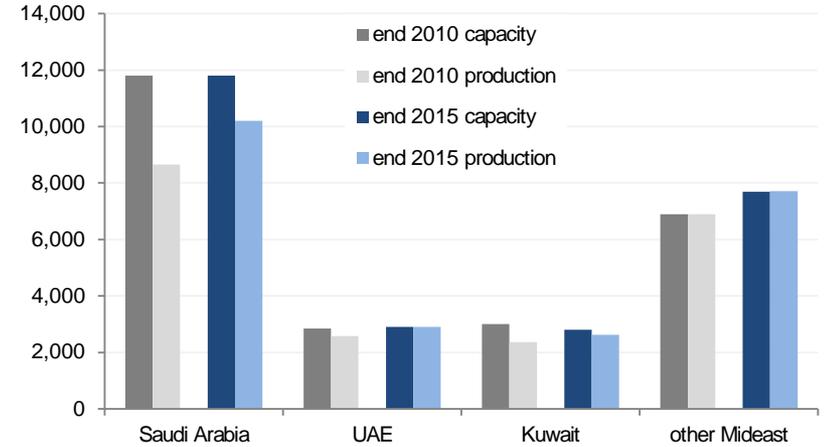
Opec: A Look at Spare Capacity and Saudi Arabia

We forecast flat Saudi exports next year

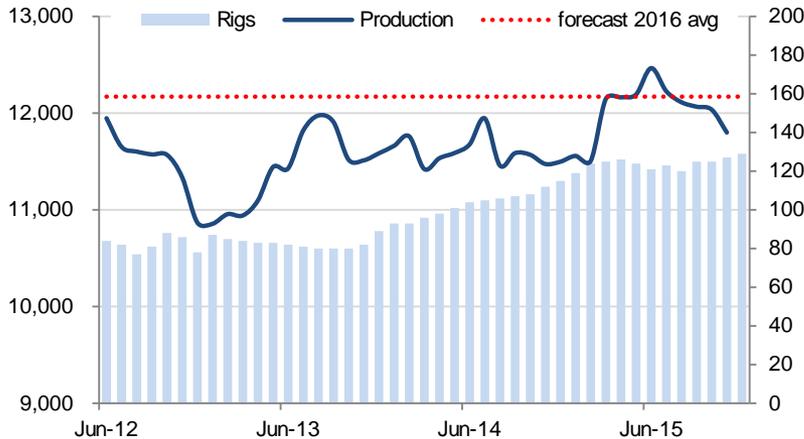
Opec-11 Crude Oil Production, Saudi Arabia and Iraq the 2015 Gains (Mb/d)



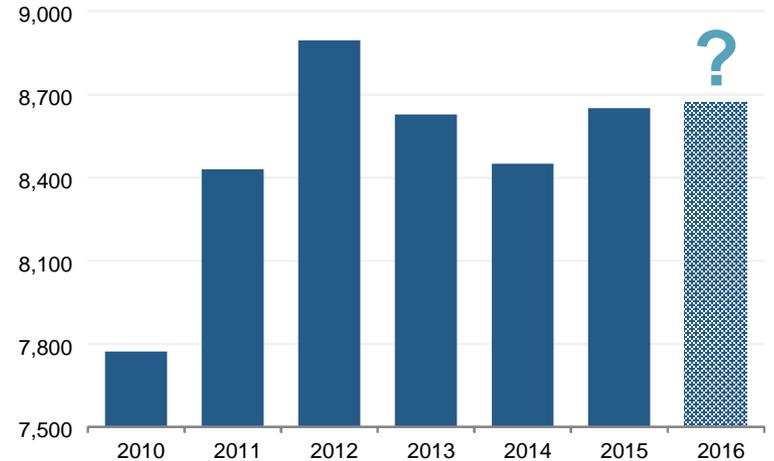
Opec Spare Capacity by Country (kb/d)



Saudi Arabia Production (kb/d)



Implied Saudi Exports (Crude + Product, kb/d)



Iran Post Sanctions Goes to the Status Quo Ante

In our view, structurally changing that status quo so as to drive oil production meaningfully higher than old averages will take time and is unlikely before 2020.

Greater exports from Iran are imminent

- In the nearer term, we expect Iran to deliver 490 kb/d in growth in 2016, which comes in two tranches. Yes, there are decline rates, but improving recovery factor is an offsetting factor plus there is additional condensate production from South Pars. Beyond 2016, Iran has ambitions to produce 5mbd by 2020, which includes new areas in West Karoun as well as higher condensates volumes.
- For the period beyond, however, much will depend on the success of the bid round in 1H16, which continuously gets pushed to the right. Iran's recent unveiling of the framework of its new upstream contract in Iran revealed little, which may be an indication that things might not be going as smoothly as expected.
- Considering the significant capital investment required, coupled with firming up of new contract terms and signing up new companies, the target to 2020 (most notably the oil [ex condensate] side of the equation) looks ambitious to us. We would argue that the oil bid round may see only a few IOCs participate, and if anything, we argue IOCs would be more interested in gas, leaving Iran with NOCs to help them develop the oil fields.
- We are generally of the view that NIOC is relatively capable in managing oil fields, with perhaps the exception of EOR, and thus terms for oil development may not be sufficiently attractive for most European Majors.

Iran to return fast?

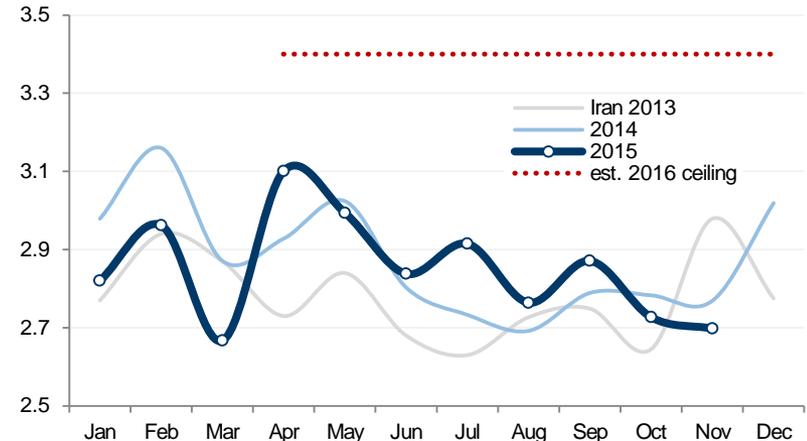
- A fast return to pre-sanction levels implies that Iran successfully managed field-decline rates estimated between 8-12%.
- Decline rates are one side of the equation, with improving recovery factors being the other, and that has been offsetting decline rates. This is quite consistent with industry feedback, which suggests that Iran could easily physically bring back 500kdb in volumes once sanctions are removed.

□ The IEA stated "...some of Iran's core oil fields... may have been revived under sanctions. Shutting down large volumes of oil may have allowed pressure to rise leaving them capable of a swift increase of ~ 600kdb."

Iran production volumes forecast (3mma, Mb/d, all liquids)



Large Opec crude oil gains in 2016 limited to Iran (Mb/d)



Iraq's Export Trajectory Seems to Lack Underpinning

Large production-potential; but many, many 'above ground' issues to resolve

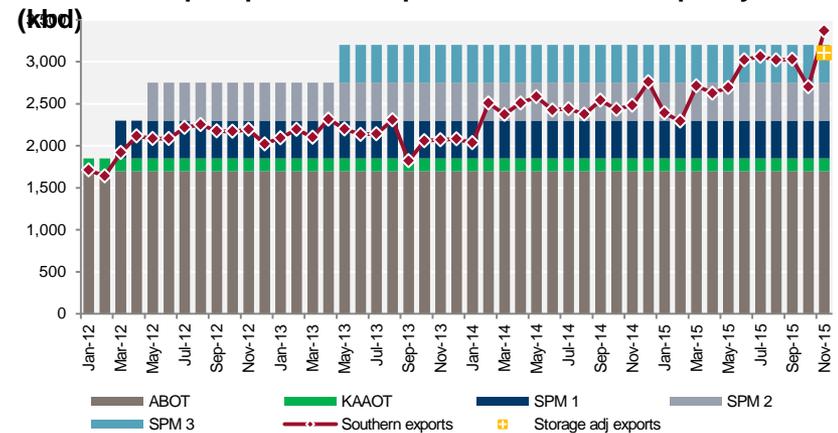
Iraq in 2015 and Our Assumptions for 2016

- Iraq has delivered strong supply growth in 2015, both from the South and the North (Iraqi Kurdistan). In the South, growth accelerated most notably from June 2015 when the new blend, Basrah Heavy, was launched, see Exhibit 103.
- The growth comes on the back of investments from prior years, but, as we look forward with oil companies having reduced their budgets in 2015 as well as for 2016, we would argue Iraq as a whole has peaked in absolute production for now, which still translates to some 125 kb/d of average annual growth y/y for 2016, given easier 1H comparisons. Further out, we see potential declines in 2017.

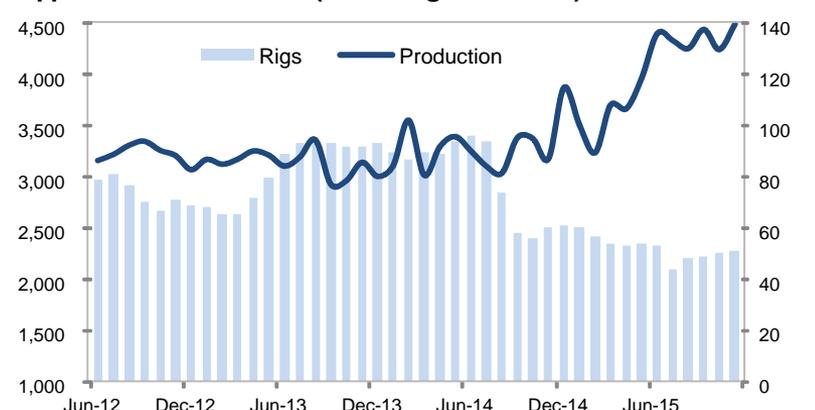
Southern Dilemma — More Political than Technical

- Aside from oil prices and ongoing contract renegotiations, additional phases on the fields are unlikely to be sanctioned for a number of years. Thus, we see growth to 2020 as being relatively limited.
- That aside, there are also infrastructure constraints. We believe export capacity is currently capped at 3.1-3.2mbd; ~1.7mbd can be exported from ABOT, ~100-200kbd from KAAOT, and the remainder will come from three new SPMs, two of which are used for the new blend. (The SPMs each have ~900kbd nameplate capacity, though it is unclear if storage and pumping infrastructure is robust enough to achieve those levels any time soon – we assume around half the level.)
 - Generally, three links could hamper exports from the South, namely (a) the network of pipelines, (b) the lack of storage facilities, and (c) the pumping station that provides a connection between the fields and the main export depot at Fao. Furthermore, the available pumping and storage capacity at Fao itself, an important link between the fields and the offshore loading facilities, could be an additional blockage.

Southern Iraqi 'Exports' vs. Export Infrastructure Capacity



Iraq production volumes (including Kurdistan)



Northern Dilemma — Politically and Potentially Technically

- The only viable export route in the north is under the control of Iraqi Kurdistan. Exports now exceed 600kbd, which include volumes from NOC operated fields. Similar to the South, we believe that absolute levels have reached a near-term peak owing to the lack of investments and other field-related issues. The KRG is committed to paying contracts, albeit thus far, it has been less predictable and a large amount of receivables remain outstanding.
- This means companies will not be investing heavily, and it would not surprise us to see that both Taq Taq and Tawke are already in 4Q15 going into decline as a result.

Source: Credit Suisse, Petrologistics

Global Oil Supply Decomposed (Levels & YoY Changes)

Curtailing non-Opec production after a record 2014 surge, for a low in 2016

Most of the 2015 deceleration comes in the US. Non-Opec turns down for real only next year. Opec gains share in 2016 and 2017

Supply of all liquids by region and key economy (kb/d)

Oil Supply in kbd	2014	1Q15	2Q15	3Q15E	4Q15E	2015E	1Q16	2Q16E	3Q16E	4Q16E	2016E	2017E	1Q15	2Q15	3Q15E	4Q15E	1Q16	2Q16E	3Q16E	4Q16E	2014	2015E	2016E	2017E
Global Oil	93,340	95,150	95,870	95,870	95,890	95,700	95,180	95,570	95,580	96,370	95,680	96,980	2,640	3,000	2,600	1,180	30	-300	-280	490	2,035	2,355	-20	1,300
Opec all oil	36,990	37,230	38,210	38,270	37,980	37,920	38,070	38,630	38,650	38,600	38,490	39,360	260	1,370	1,200	900	840	420	390	620	-115	935	565	870
Non Opec	54,240	55,840	55,390	55,460	55,810	55,630	54,990	54,640	54,760	55,640	55,010	55,430	2,360	1,600	1,370	250	-850	-750	-700	-170	2,140	1,385	-615	425
Non Opec EX us	41,440	42,200	41,500	41,590	41,990	41,820	41,780	41,370	41,200	41,710	41,520	41,080	600	390	580	-70	-420	-120	-390	-280	420	375	-300	-435
North America	20,390	21,350	21,040	21,380	21,390	21,290	20,790	20,510	20,940	21,290	20,880	21,670	1,790	820	800	210	-560	-530	-440	-100	1,905	900	-405	785
US	12,790	13,640	13,890	13,870	13,820	13,810	13,210	13,260	13,560	13,930	13,490	14,350	1,760	1,210	790	320	-430	-630	-310	110	1,720	1,015	-315	860
Canada	4,280	4,560	4,040	4,380	4,490	4,370	4,580	4,280	4,400	4,420	4,420	4,440	260	-110	170	50	20	240	20	-70	280	90	55	15
Mexico	2,790	2,620	2,540	2,590	2,550	2,580	2,470	2,400	2,440	2,400	2,430	2,320	-230	-290	-160	-160	-150	-150	-150	-150	-95	-210	-150	-110
South America	8,350	8,580	8,460	8,450	8,460	8,480	8,430	8,450	8,390	8,450	8,430	8,330	390	230	50	-130	-150	-10	-60	-10	290	130	-55	-100
Venezuela	2,720	2,680	2,680	2,640	2,640	2,670	2,640	2,590	2,560	2,560	2,590	2,600	-30	-30	-60	-80	-80	-80	-80	-80	5	-50	-80	10
Brazil	2,820	3,020	2,960	3,080	3,070	3,030	3,060	3,120	3,130	3,200	3,130	3,110	400	240	190	40	40	150	50	130	275	215	95	-20
Argentina	630	630	630	625	620	625	615	610	605	610	610	650	-5	10	0	-10	-15	-25	-20	-10	-10	-5	-15	40
Columbia	990	1,030	1,020	970	980	1,000	970	960	940	910	940	860	30	50	-20	-30	-60	-60	-40	-70	-20	10	-55	-80
Europe	4,230	4,350	4,460	4,320	4,440	4,390	4,220	4,200	4,080	4,330	4,210	3,990	20	290	250	90	-130	-250	-240	-120	35	165	-185	-215
Norway	1,870	1,940	1,920	1,910	1,970	1,930	1,880	1,770	1,740	1,880	1,820	1,690	40	140	40	20	-60	-150	-170	-90	50	60	-115	-125
United Kingdom	840	890	980	880	940	920	820	860	790	880	840	780	-50	120	200	70	-70	-120	-100	-60	-15	85	-85	-65
FSU	14,060	14,280	14,240	14,070	14,310	14,230	14,390	14,350	14,140	14,430	14,330	14,390	140	220	110	210	110	110	70	110	-30	170	100	65
Russia	10,790	10,950	10,970	10,890	11,050	10,960	11,080	11,110	11,020	11,190	11,100	11,190	120	170	190	200	140	140	130	140	10	170	135	90
Kazakhstan	1,760	1,800	1,750	1,680	1,770	1,750	1,790	1,730	1,660	1,760	1,740	1,760	20	40	-70	-30	-20	-10	-10	-20	-20	-10	-15	20
Azerbaijan	850	870	830	830	820	840	850	830	790	820	820	770	-20	-40	-30	30	-20	0	-40	0	-30	-15	-15	-50
Middle East	29,010	29,300	30,310	30,410	30,010	30,010	30,250	30,840	30,940	30,880	30,730	31,280	160	1,210	1,510	1,090	940	530	530	870	355	1,000	715	555
Saudi Arabia	11,790	11,860	12,320	12,140	11,920	12,060	12,150	12,170	12,170	12,170	12,170	12,270	0	500	280	290	300	-150	40	260	110	275	110	100
Iran	3,600	3,510	3,680	3,550	3,410	3,540	3,650	4,150	4,150	4,150	4,030	4,400	-210	40	90	-170	140	470	600	740	70	-60	490	375
UAE	3,710	3,740	3,800	3,850	3,840	3,810	3,750	3,860	3,920	3,920	3,860	3,930	120	100	60	120	10	60	80	80	60	100	55	70
Kuwait	3,120	3,210	3,060	3,120	3,020	3,100	3,080	3,030	3,080	3,030	3,050	3,060	40	-50	0	-80	-130	-30	-40	10	-5	-20	-50	5
Iraq	3,310	3,500	4,030	4,360	4,390	4,070	4,200	4,200	4,200	4,200	4,200	4,210	280	700	1,170	900	700	170	-160	-190	160	760	125	10
Qatar	2,110	2,120	2,110	2,090	2,170	2,120	2,110	2,100	2,100	2,100	2,100	2,080	-30	0	-20	120	-10	0	10	-70	-10	15	-20	-20
Africa	8,420	8,360	8,320	8,290	8,340	8,330	8,240	8,260	8,210	8,210	8,230	8,640	100	100	-330	-250	-120	-60	-80	-130	-465	-95	-100	415
Nigeria	2,370	2,350	2,300	2,310	2,410	2,340	2,300	2,300	2,300	2,300	2,300	2,350	-20	-120	-40	80	-50	0	-10	-110	65	-25	-45	50
Algeria	1,520	1,500	1,470	1,450	1,430	1,460	1,420	1,410	1,390	1,380	1,400	1,350	10	-70	-110	-70	-80	-60	-60	-50	40	-60	-60	-50
Libya	480	360	410	370	370	380	390	390	390	390	390	810	-50	150	-250	-260	30	-20	20	20	-545	-105	15	420
Angola	1,710	1,810	1,830	1,860	1,850	1,840	1,840	1,870	1,840	1,840	1,850	1,800	150	180	100	70	30	50	-20	-10	-90	125	15	-50
Sudan	270	270	260	250	240	250	260	260	260	260	260	250	10	-20	-20	-20	-10	0	10	20	50	-15	5	-10
Asia	8,930	8,930	9,040	8,950	8,940	8,960	8,860	8,950	8,880	8,790	8,870	8,670	50	130	210	-50	-70	-90	-70	-150	-55	85	-95	-205
Indonesia	840	810	840	830	860	830	870	880	880	880	880	860	-40	-10	-10	40	60	40	50	20	-40	0	45	-20
China	4,220	4,250	4,340	4,310	4,320	4,310	4,270	4,290	4,300	4,270	4,280	4,200	40	120	160	10	10	-50	-20	-40	20	85	-25	-80
India	880	890	860	870	870	870	870	860	850	840	860	830	0	-10	10	-30	-10	0	-20	-30	-5	-5	-15	-30

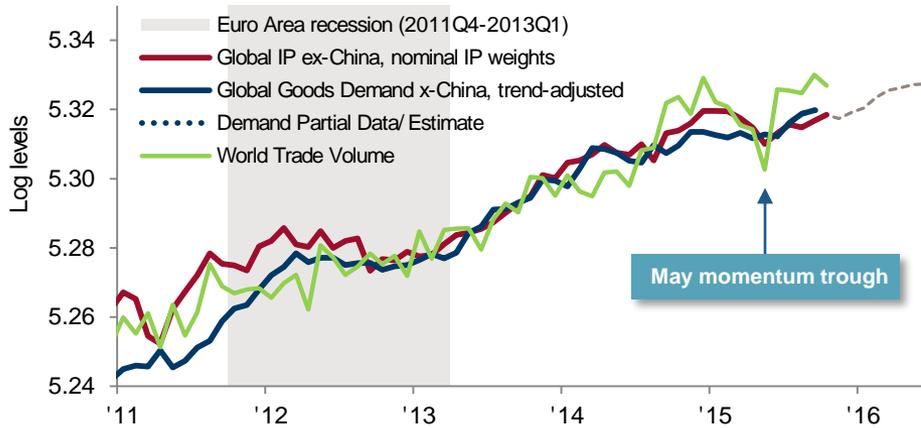
Demand : The Macro Environment in 2015

Marked deterioration of IP & Trade, not so much of Global Goods Demand

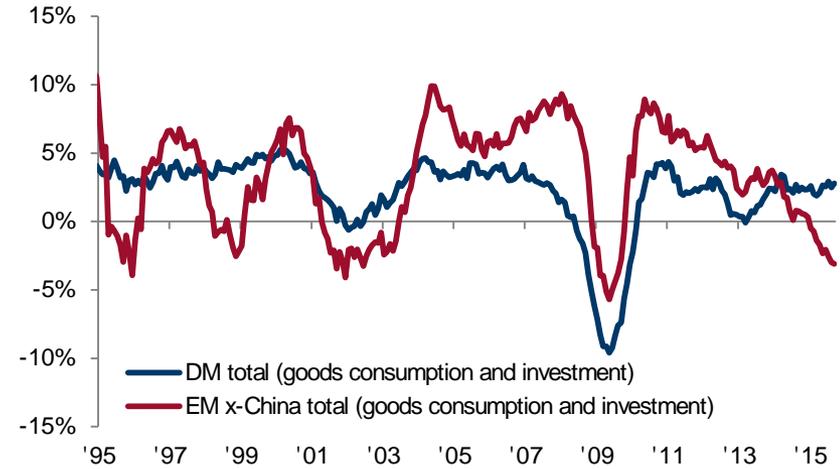
Longer history and real/relevant measures of activity:

Global Goods Demand, Production and Trade

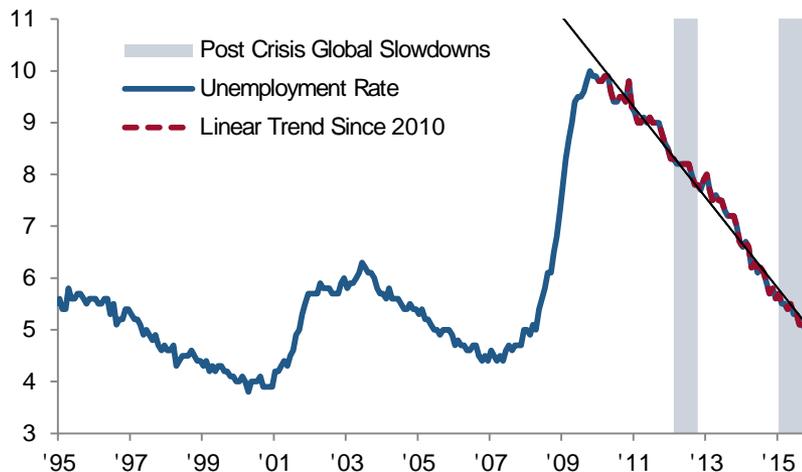
(In which Goods Demand is Adjusted IP Components from $[C + I + G - M]$)



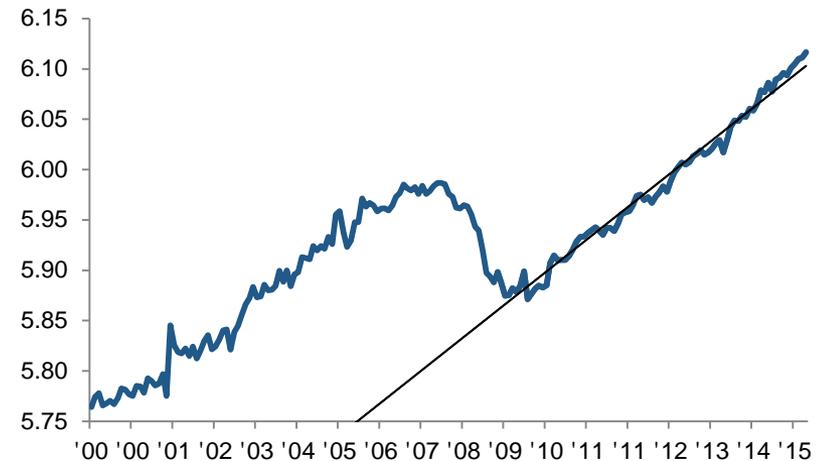
Global Goods Demand



US Unemployment Rate



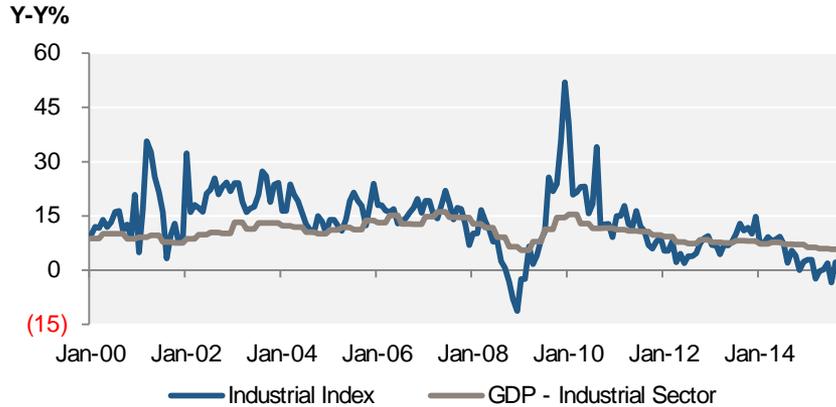
US Real Retail Sales



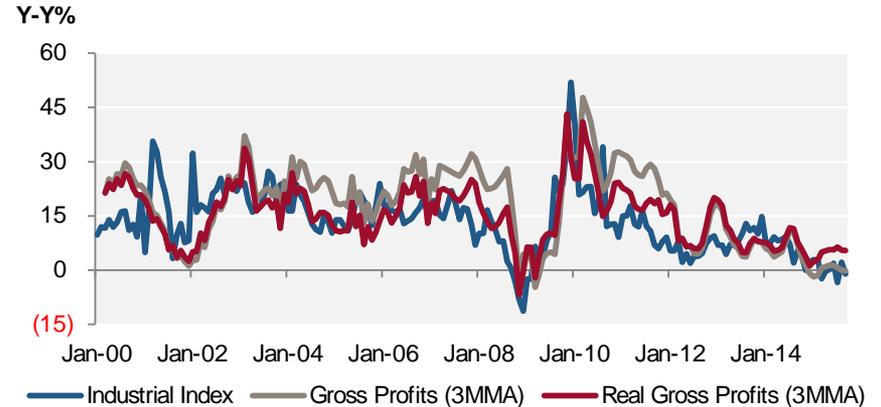
China : An Industrial Recession & Shift to Services

To supplement a great primer on the trend shifts underway

Industrial Activity Index vs. Industrial Sector GDP



Industrial Activity Index vs. Industrial Gross Profits



Global Commodity Futures Price Index vs. Chinese Industrial Activity



Comparing GDP and Activity Indexes

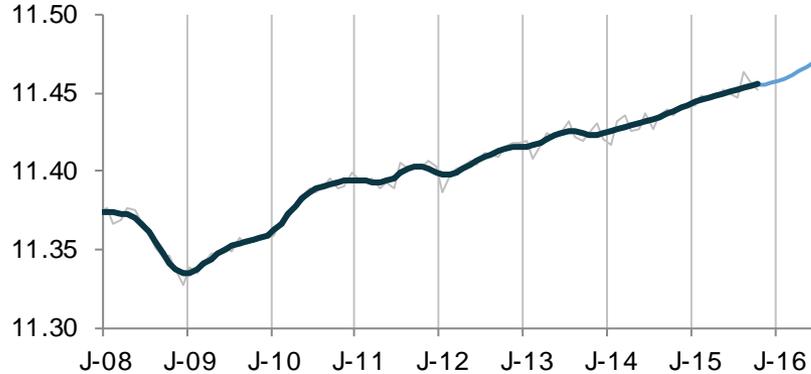
Weighting in GDP (%)	2010-1H'15	Year-to-date %*	
		GDP	Activity Indices
All Sectors	100.0	6.9	5.3
Industrial	44.5	6.0	0.3
Services	46.4	8.4	10.3
Transport, Storage and Post	4.6	4.7	2.3
Commerce	11.0	6.0	6.8
Real Estate	6.0	3.6	(3.3)
Finance	7.2	17.0	16.2
Other Services	17.6	9.0	16.8

Our Base Case: Upward Demand Trends in All Regions

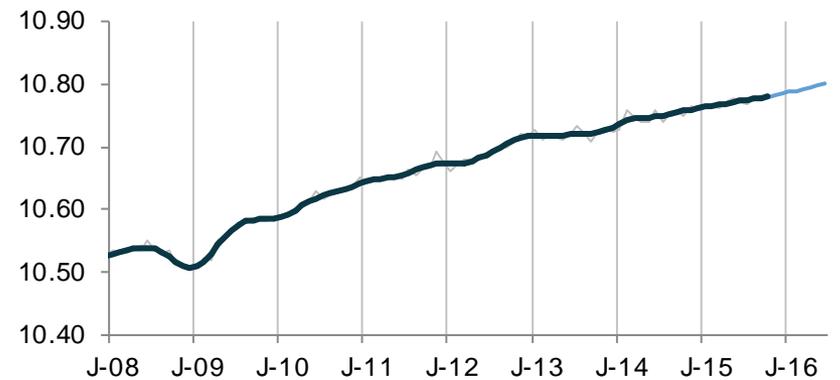
Weakness last year was concentrated in the OECD, but US has upside

These trend charts reflect monthly data (through October for nearly all bigger economies), which we seasonally adjusted and trend normalized (LN)

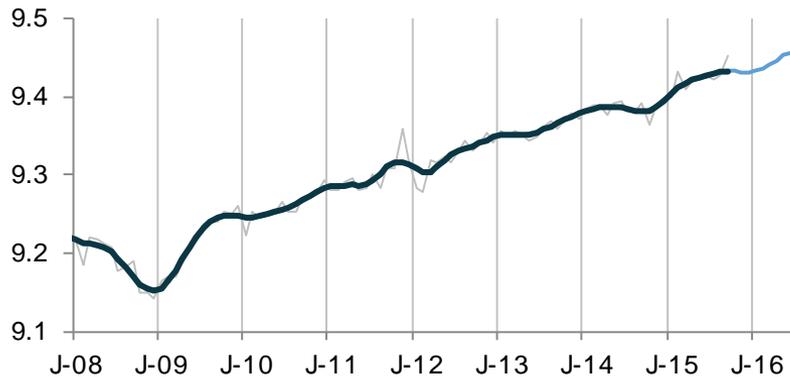
Global demand growth is healthy (SA 3mma LN scale)



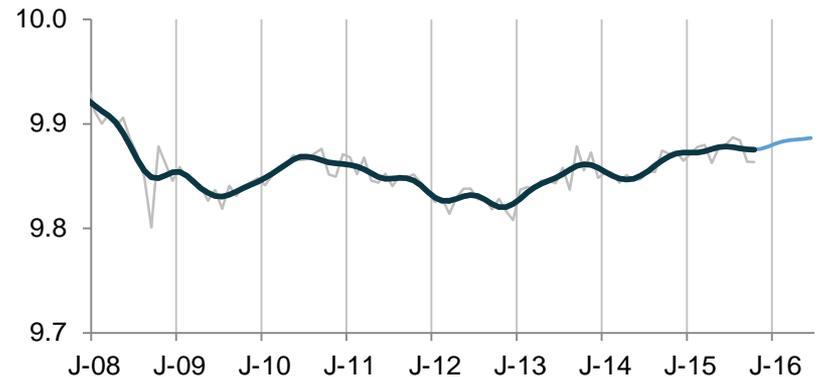
No debate that oil demand across Emerging Markets grows less fast



It is clear too, however, that even in EM Asia ex-China fears seem overblown



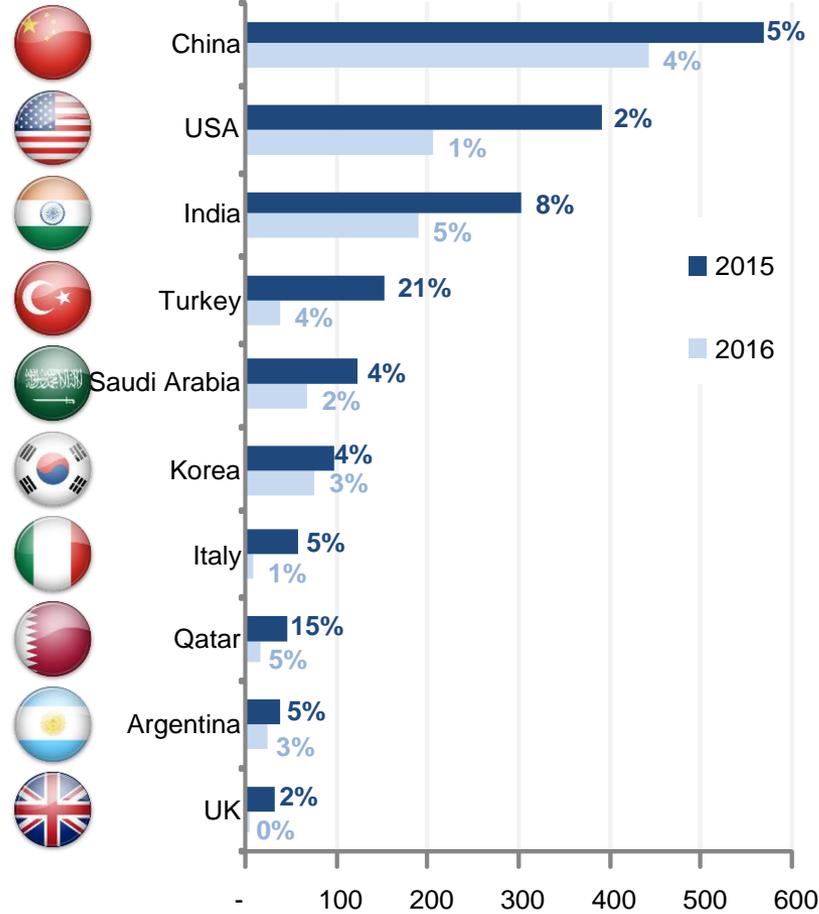
Upside to the cyclical upturn in the US world's biggest oil market



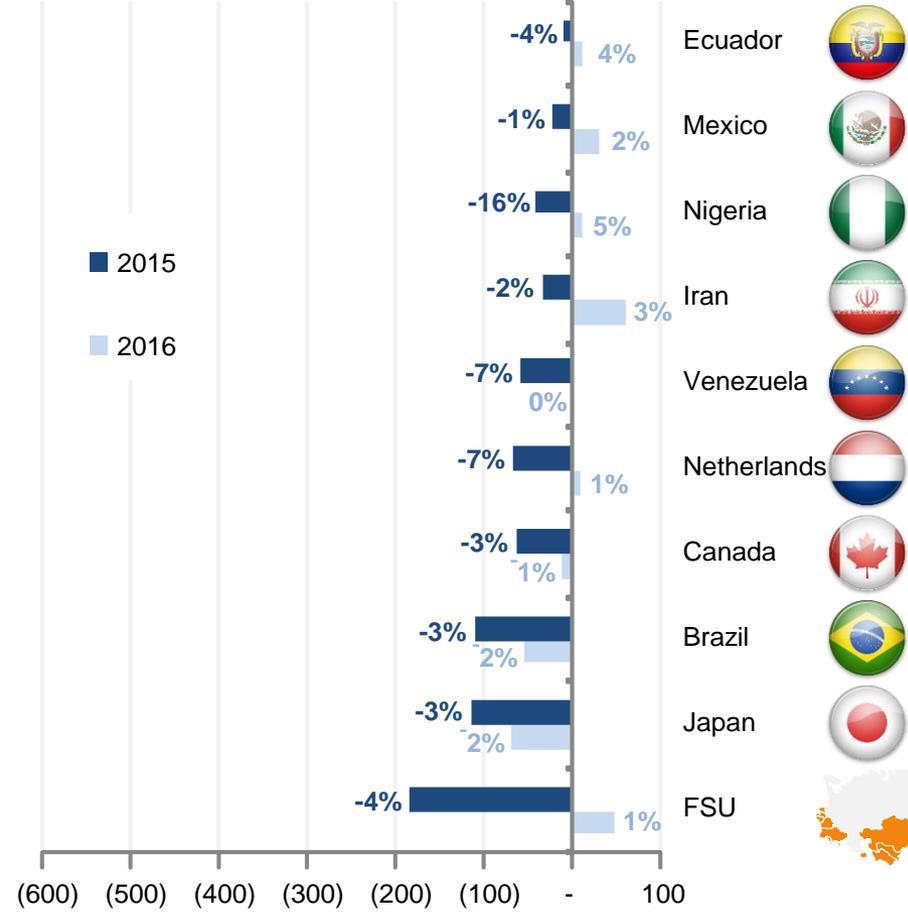
Oil Demand: Top-10 Gainers and Losers of 2015

And how those rankings change in our central scenario for next year

Largest demand gains 2015, and projected for 2016 (kb/d)



Largest demand declines 2015 (kb/d)



Global Oil Demand Growth (YoY) Decomposed

Growth remains on track to outperform nearly all expectations, primarily because developed economies are using more oil cyclically

OECD is on track for a projected 900 kb/d swing in its oil demand growth this year. That more than compensates for what seems to be a cyclical, ~200 kb/d downturn in expected demand growth across EM economies. Neat as well is that the pace of growth globally has smoothed to about +2.1% and held there for the third quarter. For the year as a whole we see 1.8% growth.

1,000 b/d	Base %	by quarter (2014 - 2016)												by year (2013-16)				*norm	by year in kb/d			
		2014	1Q14	2Q14	3Q14	4Q14	1Q15	2Q15	3Q15	4Q15E	1Q16E	2Q16E	3Q16E	4Q16E	2013	2014	2015E		2016E	2010-14	2013	2014E
Global	92,330	1.2%	0.7%	1.0%	1.4%	1.8%	2.0%	2.1%	1.4%	1.5%	1.9%	1.7%	1.7%	1.6%	1.1%	1.8%	1.7%	1.2%	1.399	999	1677	1592
OECD	45,680	0.0%	-1.7%	-0.9%	-0.3%	1.6%	1.2%	1.8%	0.4%	0.3%	1.1%	0.5%	0.8%	0.2%	-0.7%	1.2%	0.7%	-0.7%	84	-339	565	312
Emerging Markets	46,650	2.5%	3.2%	3.0%	3.2%	2.0%	2.8%	2.4%	2.3%	2.6%	2.7%	2.9%	2.6%	2.6%	3.0%	2.4%	2.7%	3.4%	1315	1338	1112	1280
OECD Americas	24,140	0.4%	-0.6%	0.2%	1.0%	1.5%	1.6%	1.5%	0.1%	0.6%	1.2%	0.8%	1.1%	1.9%	0.3%	1.2%	0.9%	-0.1%	442	66	281	227
Canada	2,400	1.1%	-1.6%	2.3%	1.7%	-2.0%	-2.5%	-2.6%	-3.3%	-2.1%	0.4%	0.4%	-1.0%	-1.2%	0.9%	-2.6%	-0.6%	0.7%	-28	21	-63	-13
Mexico	2,010	-4.8%	-5.3%	-3.8%	-2.1%	-4.2%	-3.4%	2.2%	0.7%	1.8%	1.7%	1.4%	1.4%	-0.5%	-4.0%	-1.2%	1.6%	-0.9%	-11	-84	-23	31
USA	19,110	1.0%	0.3%	0.5%	1.3%	2.5%	2.6%	1.9%	0.5%	0.9%	1.2%	0.8%	1.3%	2.5%	0.8%	1.9%	1.1%	-0.1%	471	144	356	209
South America	6,790	3.5%	1.8%	2.6%	2.4%	0.3%	-0.6%	-3.1%	-2.2%	-0.1%	0.2%	0.9%	0.3%	4.1%	2.6%	-1.4%	0.3%	3.6%	258	169	-98	22
Brazil	3,170	5.5%	4.6%	4.3%	4.6%	0.4%	-2.6%	-5.8%	-5.6%	-2.6%	-2.2%	-0.6%	-1.9%	4.8%	4.7%	-3.5%	-1.8%	4.4%	138	143	-111	-56
Argentina	760	1.3%	-8.5%	-2.1%	-1.4%	2.8%	12.8%	3.6%	2.0%	3.0%	3.0%	3.0%	3.0%	3.0%	-2.7%	5.1%	3.0%	2.5%	22	-21	39	24
Europe	14,270	-0.8%	-3.1%	-0.8%	-0.6%	3.6%	1.4%	2.7%	1.2%	0.6%	1.2%	0.2%	0.7%	-1.8%	-1.3%	2.2%	0.7%	-2.2%	-259	-193	315	97
France	1,650	-5.3%	-5.8%	-1.3%	-1.6%	2.6%	-0.1%	0.1%	-1.5%	1.4%	-0.9%	-4.6%	-1.4%	-1.5%	-3.5%	0.3%	-1.4%	-2.4%	-26	-60	5	-23
Germany	2,400	1.2%	-7.6%	0.6%	-0.3%	1.5%	-2.0%	-0.4%	0.6%	-1.0%	3.8%	0.3%	1.0%	1.9%	-1.6%	-0.1%	1.0%	-0.7%	46	-39	-2	24
Italy	1,220	-3.4%	-2.0%	-3.1%	-2.7%	2.2%	7.6%	7.9%	1.4%	0.7%	0.7%	0.7%	0.9%	-8.1%	-2.8%	4.8%	0.7%	-5.6%	-110	-35	59	9
UK	1,510	1.4%	-2.4%	-0.9%	2.8%	3.2%	1.8%	3.3%	0.6%	0.4%	0.2%	0.2%	0.3%	-1.6%	0.2%	2.2%	0.3%	-1.8%	-25	3	33	4
Other Europe	7,490	-0.4%	-1.3%	-0.7%	-0.9%	4.8%	1.8%	3.2%	2.1%	1.0%	1.1%	1.1%	1.1%	-1.9%	-0.8%	2.9%	1.1%	-2.1%	-143	-62	220	83
FSU	4,730	8.7%	3.1%	1.4%	3.2%	-5.3%	-5.7%	-2.9%	-2.0%	0.0%	1.0%	2.0%	1.0%	2.2%	4.0%	-3.9%	1.0%	4.1%	98	180	-184	46
Mideast	8,290	3.5%	4.2%	2.2%	4.7%	0.2%	3.9%	2.9%	4.6%	2.5%	2.4%	2.4%	2.5%	2.6%	3.6%	2.9%	2.4%	3.7%	203	291	243	207
Saudi Arabia	3,340	6.1%	13.3%	8.8%	9.1%	3.8%	5.8%	4.0%	8.0%	2.1%	2.0%	2.0%	2.0%	2.3%	9.4%	5.4%	2.0%	5.4%	70	288	181	70
Iran	2,060	-1.7%	-6.7%	-4.7%	5.5%	-6.9%	-0.4%	-1.5%	-0.3%	3.0%	3.0%	3.0%	3.0%	4.4%	-2.0%	-2.3%	3.0%	2.5%	89	-43	-47	60
Iraq	619	7.7%	5.7%	-5.7%	4.4%	-1.2%	3.4%	4.2%	-2.0%	1.1%	1.0%	1.0%	2.0%	7.2%	2.6%	1.1%	1.3%	13.2%	40	-40	7	8
Africa	3,860	0.5%	3.5%	7.4%	2.6%	4.8%	3.0%	3.0%	4.0%	3.8%	4.2%	4.6%	4.5%	4.6%	3.4%	3.7%	4.3%	2.5%	165	126	143	171
Egypt	840	3.4%	5.9%	12.6%	1.8%	3.9%	-2.3%	0.1%	3.9%	2.2%	2.0%	2.0%	2.0%	1.8%	5.9%	1.5%	2.1%	2.2%	14	47	12	18
Asia-Pac	30,260	0.9%	1.7%	1.0%	1.2%	2.6%	3.7%	4.0%	2.7%	2.5%	2.9%	2.7%	2.4%	1.7%	1.2%	3.2%	2.6%	2.5%	492	359	978	822
China	10,590	-1.6%	2.0%	3.8%	5.6%	6.2%	6.3%	4.8%	2.3%	4.0%	3.9%	4.1%	4.0%	2.2%	2.5%	4.9%	4.0%	3.4%	224	256	515	443
India	3,850	1.6%	3.8%	4.3%	3.3%	5.1%	7.1%	9.4%	9.9%	5.6%	5.5%	4.6%	2.8%	1.1%	3.2%	7.9%	4.6%	3.8%	41	121	303	191
Indonesia	1,600	12.2%	13.1%	-1.4%	-6.6%	-0.7%	-0.8%	2.9%	0.7%	1.4%	1.5%	1.5%	1.5%	4.0%	3.8%	0.5%	1.5%	2.5%	59	59	8	24
Japan	4,350	0.7%	-4.7%	-8.8%	-5.9%	-5.6%	-1.0%	0.3%	-4.7%	-3.1%	-1.0%	-1.6%	-1.2%	-3.0%	-4.5%	-3.0%	-1.8%	-0.4%	-141	-206	-129	-74
South Korea	2,340	0.6%	0.5%	1.9%	-0.9%	5.5%	0.4%	2.7%	9.4%	3.1%	3.2%	3.6%	2.7%	0.3%	0.5%	4.5%	3.1%	0.8%	7	12	106	77
Australia	1,080	0.0%	-0.1%	0.0%	0.0%	2.0%	-1.1%	0.6%	1.0%	1.0%	1.0%	1.0%	1.0%	0.5%	-0.1%	0.6%	1.0%	1.6%	6	-1	7	11
Thailand	1,280	0.5%	2.8%	0.9%	-0.9%	-0.1%	0.0%	1.9%	1.9%	3.0%	3.0%	3.0%	3.0%	2.7%	0.8%	0.9%	3.0%	3.8%	34	10	12	39

OECD growth, watch EU

Expected in the US, less so from Europe

Europe's oil use remains on track to grow by 2.2%, which would be a sharp (500 kb/d) turn-around from the -1.3% decline featured in 2014. And contrasts with 10-years of average -1.5% declines

In the US, oil demand should grow by 360 kb/d, around 2.5x last year's pace

EM slows down more ...

Anticipated slowing down is in evidence in Latam and FSU, but Asia outperforms

Our forecast slowing of Asia's growth in H2 demand growth has proved too conservative, as Q3 hit +4%

All this could turn ugly fast if the macro turns south

Inventories Are the Bottom Line: They Need to Stop Rising

Commercial oil inventory in the OECD has been tracking up ever further into record territory ... in our view this stops in crude oil this quarter

We focus here on the inventories we can measure of the more important commercial stocks of crude oil and products in what are often called the Developed Market economies belonging to the OECD. In addition, there are several categories of sizeable inventories that the market has at least some visibility on, for instance downstream and crude oil stocks in China, independent storage in Singapore and ARA and South Africa, as well as stocks in Saudi Arabia and of course the aggregate of oil cargoes in transit aboard tankers at sea. Suffice it to say that all these stocks have risen a lot .

How big is the measurable surplus?

□ In the OECD alone there are at least 250 million barrels too many

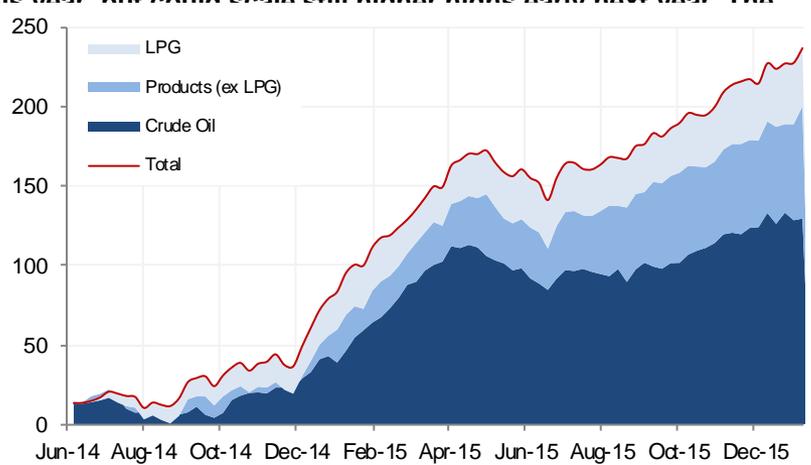
- Expressed in days of demand cover, we plot in the chart below left the number of days of forward oil demand in the OECD against a five year moving average as well as yoy. At the end of October, OECD stocks held more than 5 days more stocks than normal and in November that likely did not go down by more than a fraction, while the yoy surplus was at its widest, at 4.7 days. By both measures there would appear to be some 250 million too many barrels in inventory.
- Similarly, in simple nominal terms commercial OECD inventory should add up to some 2950 million barrels at the end of November, about 240 Mbs more than normal. Both these measures are somewhat inflated since the IEA is now counting some 20 Mbs of Asia Pacific inventory it was not counting before.

□ So in our base case, it would take more than a half a year to drain the surplus

OECD Inventory Cover, Days
 OECD commercial oil stocks in days of demand cover, peak in August for this year, but could scale still higher highs early next year. The surplus is only very narrow



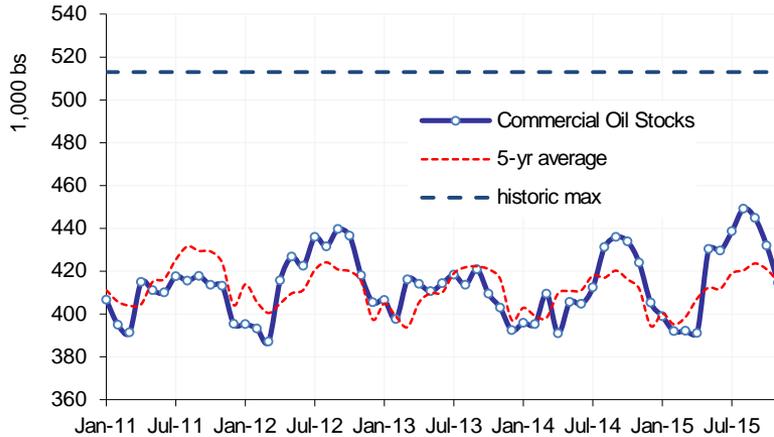
US inventory surplus to the 5 year average (Mbs)



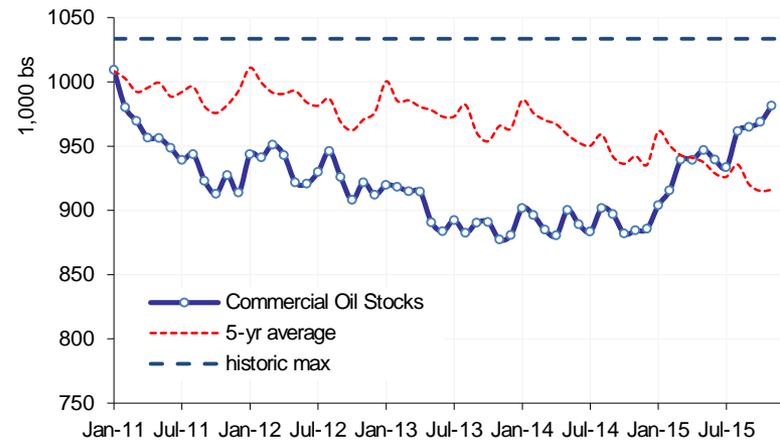
Monitoring Inventory: Still Plenty of Room

Much of the visible inventory surplus has collected in the US: Watch that space

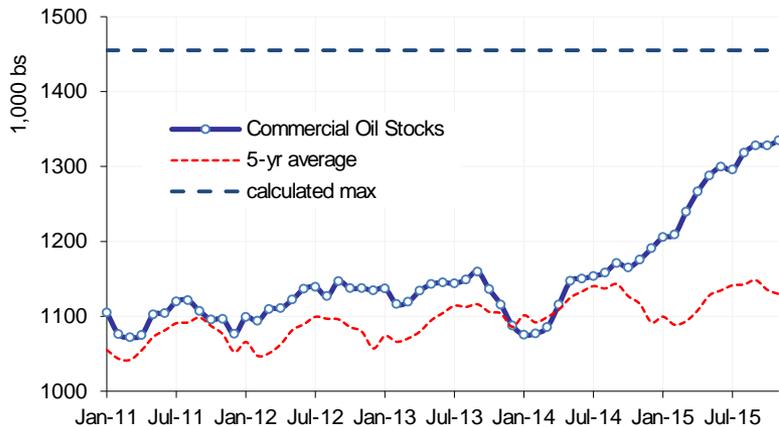
As do OECD Asia total inventories



Total OECD Europe stocks surpass 5 year average



Delta driven by USA



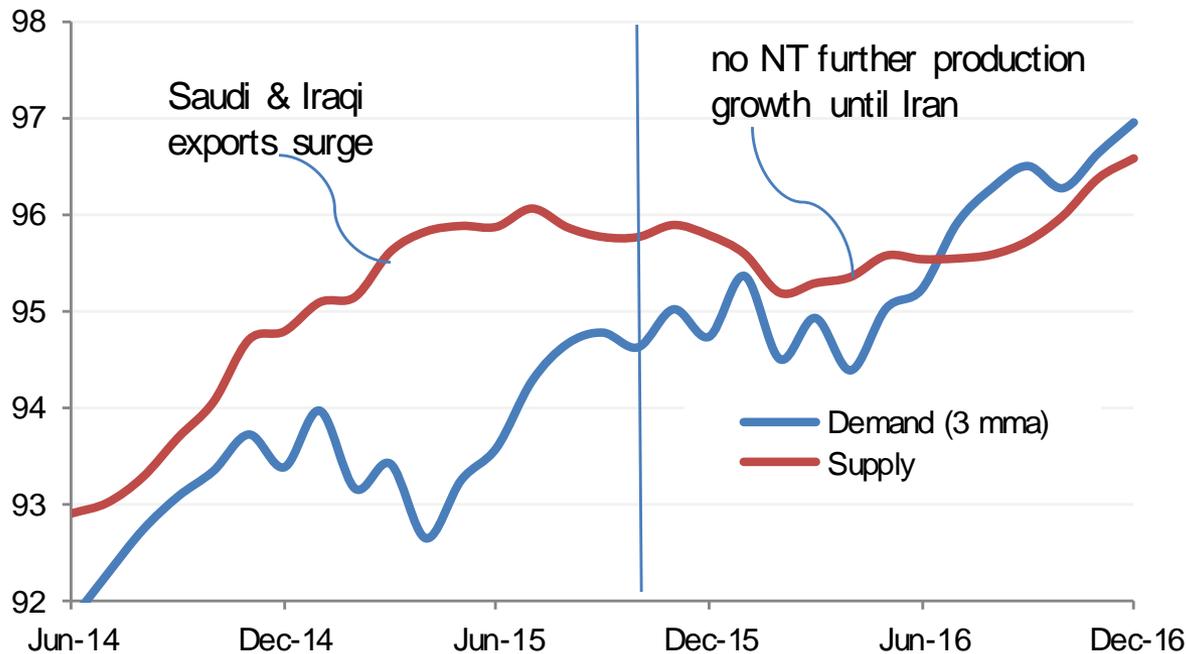
Spare capacity of inventory remains quite large:

- In the OECD alone there should be about 260 mbs of left over on-land storage capacity:
 - Since inventory in Europe is ~50 mbs shy of historic record-fill; in Asia at end-November there was ~90 mbs left below the historic max; while in the US crude oil inventory is still some ~120 mbs shy of max working capacity.
- Additionally, tankers storage offers further capacity, which is now more relevant (after the lifting of the US crude export ban).
- Lastly, China is expected to add 60-70 million barrels of storage capacity in 2016.

Oil Macro — Global Balances (Inventories)

We look for inventory draws in 2H16

Balance, stocks	2012	Q1-'13	Q2-'13	Q3-'13	Q4-'13	2013	Q1-'14	Q2-'14	Q3-'14	Q4-'14	2014	Q1-'15	Q2-'15	Q3-'15E	Q4-'15E	2015E	Q1-'16E	Q2-'16E	Q3-'16E	Q4-'16E	2016E	2017E
Implied inventory change	0.5	0.4	0.6	-0.4	-0.7	0.0	1.1	1.5	0.6	1.0	1.0	2.1	2.6	1.2	0.9	1.7	0.7	0.6	-0.7	-0.3	0.1	-0.1
Reported oil inventory:																						
OECD stock change	0.2	0.0	0.0	0.4	-1.4	-0.3	0.2	0.8	0.7	-0.2	0.4	0.9	1.1	0.8	-0.3	0.6	0.5	0.1	-0.5	-0.5	-0.1	
OECD inventory (billion barrels)	2.67	2.67	2.67	2.70	2.58	2.58	2.59	2.67	2.73	2.71	2.71	2.79	2.89	2.97	2.94	2.94	2.99	3.00	2.96	2.91	2.91	
Cover, days demand	58.4	58.6	57.6	58.1	56.4	56.4	57.9	58.1	59.0	58.3	58.3	61.6	62.1	63.4	62.9	62.9	65.2	64.0	62.9	62.4	62.4	
'Call on Opec & stocks'	31.4	30.5	30.8	31.4	30.9	30.9	29.4	28.9	30.0	29.6	29.5	28.7	29.1	30.6	30.7	29.8	30.9	31.5	32.8	32.3	31.9	32.8
YoY Growth, net mb/d	-0.3	0.5	-0.2	-1.1	-1.3	-0.5	-1.0	-1.9	-1.4	-1.3	-1.4	-0.7	0.2	0.6	1.1	0.3	2.1	2.4	2.2	1.6	2.1	0.9
YoY Growth, %	-1.1%	1.8%	-0.5%	-3.3%	-3.9%	-1.5%	-3.4%	-6.2%	-4.6%	-4.4%	-4.7%	-2.3%	0.8%	2.0%	3.8%	1.1%	7.4%	8.4%	7.3%	5.4%	10.9%	12.7%
'Call on Saudi & stocks'	9.5	9.0	9.2	10.8	10.7	9.9	8.9	8.5	9.4	8.8	8.9	7.9	7.8	9.1	9.2	8.5	9.6	9.7	11.0	10.6	10.2	10.4
YoY Growth, net mb/d	-1.2	0.9	0.3	0.2	0.2	0.4	0.0	-0.7	-1.4	-2.0	-1.0	-1.0	-0.7	-0.3	0.5	-0.4	1.6	1.9	1.9	1.3	1.7	0.2
YoY Growth, %	-11.0%	10.9%	3.0%	1.9%	2.0%	4.1%	-0.5%	-7.7%	-12.6%	-18.4%	-10%	-10.9%	-7.7%	-3.6%	5.3%	-4.2%	20.7%	24.7%	21.1%	14.4%	20.0%	2.1%



Oil Macro — Global Balances (Supply)

Supply	2012	Q1-'13	Q2-'13	Q3-'13	Q4-'13	2013	Q1-'14	Q2-'14	Q3-'14	Q4-'14	2014	Q1-'15	Q2-'15	Q3-'15E	Q4-'15E	2015E	Q1-'16E	Q2-'16E	Q3-'16E	Q4-'16E	2016E	2017E	
Global	90.4	90.7	91.4	91.4	91.7	91.3	92.5	92.9	93.3	94.7	93.3	95.2	95.87	95.9	95.9	95.7	95.2	95.57	95.6	96.4	95.7	97.0	
YoY Growth, net mb/d	2.4	0.0	0.9	1.5	1.0	0.9	1.8	1.5	1.9	3.0	2.0	2.6	3.0	2.6	1.2	2.4	0.0	(0.3)	(0.3)	0.5	(0.0)	1.3	
YoY Growth, %	2.8%	0.0%	1.0%	1.7%	1.1%	1.0%	1.9%	1.6%	2.0%	3.3%	2.2%	2.9%	3.2%	2.8%	1.2%	2.5%	0.0%	-0.3%	-0.3%	0.5%	0.0%	1.4%	
Non OPEC	50.6	51.6	51.5	52.0	53.2	52.1	53.5	53.8	54.1	55.6	54.2	55.8	55.4	55.5	55.8	55.6	55.0	54.6	54.8	55.6	55.0	55.4	
YoY Growth, net mb/d	0.8	0.7	1.4	2.1	1.7	1.5	1.9	2.3	2.1	2.3	2.1	2.4	1.6	1.4	0.2	1.4	-0.8	-0.8	-0.7	-0.2	-0.6	0.4	
YoY Growth, %	1.6%	1.3%	2.8%	4.1%	3.3%	2.9%	3.6%	4.4%	4.0%	4.3%	4.1%	4.4%	3.0%	2.5%	0.4%	2.6%	-1.5%	-1.4%	-1.3%	-0.3%	-1.1%	0.8%	
North America	16.5	17.4	17.5	18.2	18.7	18.0	19.0	19.7	20.0	20.7	19.9	20.8	20.48	20.8	20.9	20.8	20.3	19.94	20.4	20.8	20.3	21.1	
YoY Growth, net mb/d	1.2	1.1	1.3	1.9	1.5	1.4	1.6	2.2	1.9	2.0	1.9	1.8	0.8	0.8	0.2	0.9	-0.6	-0.5	-0.4	-0.1	-0.4	0.8	
YoY Growth, %	7.6%	7.0%	8.0%	11.5%	8.5%	8.7%	9.1%	12.4%	10.2%	10.5%	10.6%	9.4%	4.1%	4.0%	1.0%	4.5%	-2.7%	-2.6%	-2.1%	-0.5%	-2.0%	3.8%	
South America	4.5	4.5	4.6	4.6	4.7	4.6	4.7	4.7	4.9	5.1	4.9	5.1	5.0	5.1	5.1	5.1	5.0	5.1	5.1	5.1	5.1	5.0	
YoY Growth, net mb/d	0.0	-0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.3	0.4	0.3	0.4	0.3	0.1	0.0	0.2	-0.1	0.1	0.0	0.1	0.0	-0.1	
YoY Growth, %	-0.9%	-1.9%	2.7%	4.8%	3.5%	2.2%	3.4%	3.6%	6.4%	8.1%	5.4%	8.7%	5.7%	2.6%	-0.7%	3.9%	-1.1%	1.3%	0.1%	1.1%	0.4%	-1.2%	
Europe	3.9	3.9	3.8	3.7	3.8	3.8	3.9	3.7	3.7	3.9	3.8	3.9	4.00	3.9	4.0	4.0	3.8	3.74	3.6	3.9	3.8	3.6	
YoY Growth, net mb/d	-0.3	-0.4	-0.3	0.0	0.1	-0.2	0.1	-0.1	0.0	0.1	0.0	0.0	0.3	0.2	0.1	0.2	-0.1	-0.3	-0.2	-0.1	-0.2	-0.2	
YoY Growth, %	-6.0%	-9.1%	-6.9%	-0.2%	1.5%	-3.9%	1.9%	-1.3%	-0.2%	2.8%	0.8%	0.4%	7.7%	6.6%	2.1%	4.1%	-3.5%	-6.5%	-6.4%	-3.0%	-4.8%	-5.2%	
FSU	13.6	13.9	13.8	13.8	14.0	13.9	13.9	13.8	13.8	13.9	13.8	14.1	14.0	13.9	14.1	14.0	14.2	14.1	13.9	14.2	14.1	14.2	
YoY Growth, net mb/d	0.1	0.2	0.3	0.3	0.2	0.2	0.1	0.0	0.0	-0.1	0.0	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	
YoY Growth, %	0.4%	1.4%	1.9%	2.1%	1.8%	1.8%	0.5%	-0.2%	-0.3%	-0.9%	-0.2%	1.0%	1.5%	0.7%	1.5%	1.2%	0.7%	0.8%	0.5%	0.8%	0.7%	0.4%	
Russia	10.6	10.8	10.8	10.7	10.9	10.8	10.8	10.8	10.7	10.9	10.8	10.9	11.0	10.9	11.1	11.0	11.1	11.1	11.0	11.2	11.1	11.2	
YoY Growth, net mb/d	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	
YoY Growth, %	1.0%	1.3%	1.9%	1.4%	0.9%	1.4%	0.6%	0.2%	-0.5%	0.0%	0.1%	1.1%	1.6%	1.8%	1.8%	1.6%	1.3%	1.3%	1.2%	1.2%	1.2%	0.8%	
Africa	2.2	2.1	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3							
YoY Growth, net mb/d	-0.1	-0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	
YoY Growth, %	-5.3%	-6.9%	1.4%	3.5%	6.9%	1.1%	7.0%	4.9%	2.7%	-1.3%	3.2%	0.7%	-1.3%	-1.1%	-3.2%	-1.3%	-2.6%	-1.6%	-0.9%	0.7%	-1.1%	2.0%	
Mideast	1.3	1.2	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1								
YoY Growth, net mb/d	-0.2	0.0	-0.1	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	
YoY Growth, %	-13.0%	-2.9%	-11.3%	-11.7%	-11.4%	-9.4%	-4.0%	0.1%	-2.0%	-3.6%	-2.4%	-3.6%	-6.4%	-7.0%	-7.3%	-6.1%	-4.9%	0.3%	0.6%	2.9%	-0.3%	1.3%	
Asia	8.5	8.6	8.5	8.3	8.5	8.5	8.4	8.4	8.3	8.5	8.4	8.5	8.54	8.5	8.5	8.5	8.4	8.44	8.4	8.3	8.4	8.2	
YoY Growth, net mb/d	0.2	0.0	0.1	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	0.1	-0.1	0.0	0.1	0.2	-0.1	0.1	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	
YoY Growth, %	2.0%	0.3%	1.3%	-2.7%	-2.3%	-0.9%	-1.5%	-1.4%	-0.7%	0.7%	-0.7%	0.5%	1.5%	2.4%	-0.6%	0.9%	-0.9%	-1.2%	-0.9%	-1.8%	-1.2%	-2.4%	
Processing gain	2.1	2.0	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.3	2.1	2.1	2.1	2.1	2.3	2.2	2.1	2.2	2.2	
OPEC	37.7	37.1	37.6	37.3	36.4	37.1	37.0	36.8	37.1	37.1	37.0	37.2	38.21	38.3	38.0	37.9	38.1	38.63	38.7	38.6	38.5	39.4	
YoY Growth, net mb/d	1.6	-0.7	-0.5	-0.5	-0.8	-0.6	-0.1	-0.8	-0.2	0.7	-0.1	0.3	1.4	1.2	0.9	0.9	0.8	0.4	0.4	0.6	0.6	0.9	
YoY Growth, %	4.5%	-1.8%	-1.3%	-1.4%	-2.1%	-1.6%	-0.3%	-2.1%	-0.6%	1.9%	-0.3%	0.7%	3.7%	3.2%	2.4%	2.5%	2.3%	1.1%	1.0%	1.6%	1.5%	2.3%	
Opec Crude Oil	31.9	30.9	31.4	31.0	30.2	30.9	30.5	30.3	30.5	30.5	30.5	30.8	31.7	31.8	31.5	31.5	31.6	32.1	32.1	32.1	32.1	32.0	32.7
YoY Growth, net mb/d	1.3	-1.1	-0.9	-0.9	-1.1	-1.0	-0.4	-1.1	-0.5	0.4	-0.4	0.3	1.4	1.3	1.0	1.0	0.8	0.4	0.3	0.5	0.5	0.7	
YoY Growth, %	4.2%	-3.5%	-2.8%	-2.9%	-3.6%	-3.2%	-1.3%	-3.4%	-1.6%	1.2%	-1.3%	1.0%	4.7%	4.2%	3.3%	3.3%	2.6%	1.1%	1.0%	1.6%	1.6%	2.2%	
Saudi Arabia	10.0	9.4	9.8	10.4	10.0	9.9	10.0	9.9	10.0	9.8	9.9	10.0	10.4	10.3	10.1	10.2	10.3	10.3	10.3	10.3	10.3	10.3	
YoY Growth, net mb/d	0.5	-0.8	-0.5	0.3	0.4	-0.1	0.6	0.1	-0.4	-0.3	0.0	0.0	0.5	0.3	0.3	0.3	0.3	-0.1	0.0	0.2	0.1	0.0	
YoY Growth, %	4.9%	-7.6%	-4.8%	3.3%	3.7%	-1.4%	6.4%	1.4%	-4.0%	-2.7%	0.1%	0.2%	5.2%	3.3%	3.6%	3.1%	3.1%	-1.4%	0.1%	2.0%	0.9%	0.0%	
Opec non-crude	5.8	6.2	6.2	6.3	6.2	6.2	6.5	6.5	6.6	6.5	6.5	6.4	6.47	6.5	6.4	6.5	6.5	6.53	6.5	6.5	6.5	6.7	
YoY Growth, net mb/d	0.3	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	-0.1	0.0	-0.1	-0.1	-0.1	0.1	0.1	0.1	0.1	0.1	0.2	
YoY Growth, %	5.9%	7.6%	7.3%	6.4%	5.7%	6.7%	4.8%	4.5%	4.4%	5.0%	4.7%	-0.9%	-0.7%	-1.2%	-1.7%	-1.1%	0.8%	0.8%	0.9%	1.7%	1.1%	2.6%	

Oil Macro — Global Balances (Demand)

Demand	2012	Q1-'13	Q2-'13	Q3-'13	Q4-'13	2013	Q1-'14	Q2-'14	Q3-'14	Q4-'14	2014	Q1-'15	Q2-'15	Q3-'15E	Q4-'15E	2015E	Q1-'16E	Q2-'16E	Q3-'16E	Q4-'16E	2016E	2017E
Global	89.93	90.3	90.8	91.8	92.4	91.3	91.5	91.4	92.7	93.7	92.3	93.1	93.23	94.6	95.0	94.0	94.5	95.01	96.3	96.6	95.6	97.1
YoY Growth, net mb/d	0.8	1.7	1.7	1.4	0.8	1.4	1.1	0.7	0.9	1.3	1.0	1.6	1.8	1.9	1.3	1.7	1.4	1.8	1.6	1.6	1.6	1.5
YoY Growth, %	0.9%	1.9%	1.9%	1.6%	0.9%	1.6%	1.2%	0.7%	1.0%	1.4%	1.1%	1.8%	2.0%	2.1%	1.4%	1.8%	1.5%	1.9%	1.7%	1.7%	1.7%	1.6%
OECD	45.9	45.7	45.6	46.3	46.5	46.0	45.7	44.8	45.9	46.3	45.7	46.5	45.3	46.7	46.5	46.2	46.6	45.8	46.9	46.9	46.6	46.6
YoY Growth, net mb/d	-0.6	-0.5	0.1	0.4	0.2	0.1	0.0	-0.8	-0.4	-0.2	-0.3	0.7	0.5	0.8	0.2	0.6	0.2	0.5	0.2	0.4	0.3	0.0
YoY Growth, %	-1.3%	-1.1%	0.3%	0.9%	0.5%	0.2%	0.0%	-1.7%	-0.9%	-0.3%	-0.7%	1.6%	1.2%	1.8%	0.4%	1.2%	0.3%	1.1%	0.5%	0.8%	0.7%	0.0%
Americas	23.6	23.8	23.9	24.3	24.3	24.1	23.9	23.7	24.4	24.6	24.1	24.2	24.1	24.7	24.6	24.4	24.4	24.4	24.9	24.9	24.6	24.8
YoY Growth, net mb/d	-0.4	0.4	0.3	0.6	0.5	0.4	0.1	-0.1	0.1	0.2	0.1	0.4	0.4	0.4	0.0	0.3	0.1	0.3	0.2	0.3	0.2	0.2
YoY Growth, %	-1.8%	1.7%	1.2%	2.4%	2.2%	1.9%	0.4%	-0.6%	0.2%	1.0%	0.3%	1.5%	1.6%	1.5%	0.1%	1.2%	0.6%	1.2%	0.8%	1.1%	0.9%	0.7%
Europe	14.1	13.4	14.0	14.2	13.8	13.8	13.2	13.6	14.0	13.7	13.6	13.7	13.8	14.4	13.8	13.9	13.8	13.9	14.4	13.9	14.0	13.9
YoY Growth, net mb/d	-0.4	-0.7	-0.1	0.0	-0.2	-0.2	-0.1	-0.5	-0.1	-0.1	-0.2	0.5	0.2	0.4	0.2	0.3	0.1	0.1	0.0	0.1	0.1	-0.1
YoY Growth, %	-2.9%	-4.7%	-0.4%	0.0%	-1.6%	-1.7%	-1.1%	-3.3%	-1.0%	-0.7%	-1.5%	3.6%	1.4%	2.6%	1.1%	2.2%	0.5%	1.0%	0.0%	0.5%	0.5%	-0.6%
Asia Pacific	8.2	8.6	7.7	7.8	8.4	8.1	8.7	7.5	7.5	8.1	7.9	8.5	7.4	7.6	8.1	7.9	8.5	7.5	7.6	8.2	7.9	7.9
YoY Growth, net mb/d	0.2	-0.2	-0.1	-0.1	-0.1	-0.1	0.1	-0.2	-0.3	-0.3	-0.2	-0.1	0.0	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	-0.1
YoY Growth, %	3.0%	-2.6%	-0.9%	-1.7%	-0.6%	-1.5%	0.6%	-2.4%	-4.3%	-3.5%	-2.4%	-1.4%	-0.5%	1.1%	0.3%	-0.2%	-0.7%	0.7%	0.4%	0.4%	0.2%	-0.9%
Non-OECD	44.0	44.6	45.2	45.5	45.9	45.3	45.7	46.6	46.8	47.4	46.6	46.6	47.9	48.0	48.5	47.8	47.9	49.2	49.3	49.7	49.0	50.6
YoY Growth, net mb/d	1.4	2.2	1.5	1.0	0.6	1.3	1.1	1.4	1.3	1.5	1.3	0.9	1.3	1.1	1.1	1.1	1.2	1.3	1.4	1.2	1.3	1.5
YoY Growth, %	3.3%	5.1%	3.5%	2.2%	1.3%	3.0%	2.5%	3.2%	3.0%	3.2%	3.0%	2.0%	2.8%	2.4%	2.3%	2.4%	2.6%	2.7%	2.9%	2.6%	2.7%	3.1%
Former Soviet Union	4.4	4.2	4.4	4.8	4.8	4.5	4.6	4.6	4.8	4.9	4.7	4.3	4.3	4.7	4.8	4.5	4.3	4.3	4.8	4.9	4.6	4.6
YoY Growth, net mb/d	0.1	0.0	0.0	0.2	0.2	0.1	0.4	0.1	0.1	0.2	0.2	-0.2	-0.3	-0.1	-0.1	-0.2	0.0	0.0	0.1	0.0	0.0	0.0
YoY Growth, %	2.3%	-0.6%	0.7%	3.8%	4.4%	2.2%	8.7%	3.1%	1.4%	3.2%	4.0%	-5.3%	-5.7%	-2.9%	-2.0%	-3.9%	0.0%	1.0%	2.0%	1.0%	1.0%	0.3%
China	10.1	10.4	10.3	10.2	10.4	10.3	10.2	10.5	10.6	11.0	10.6	10.8	11.2	11.1	11.3	11.1	11.3	11.6	11.6	11.7	11.5	12.0
YoY Growth, net mb/d	0.4	0.6	0.4	0.2	-0.3	0.2	-0.2	0.2	0.4	0.6	0.3	0.6	0.7	0.5	0.3	0.5	0.4	0.4	0.5	0.5	0.4	0.5
YoY Growth, %	4.1%	5.8%	4.1%	1.9%	-2.4%	2.2%	-1.6%	2.0%	3.8%	5.6%	2.5%	6.2%	6.3%	4.8%	2.3%	4.9%	4.0%	3.9%	4.1%	4.0%	4.0%	3.9%
Other emerging Asia	11.1	11.5	11.4	11.3	11.6	11.5	11.8	11.9	11.5	11.7	11.8	12.1	12.4	12.1	12.3	12.2	12.5	12.8	12.5	12.5	12.6	13.0
YoY Growth, net mb/d	0.3	0.6	0.3	0.3	0.3	0.4	0.4	0.5	0.2	0.1	0.3	0.3	0.5	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.4	0.4
YoY Growth, %	2.7%	5.1%	3.1%	3.0%	3.0%	3.6%	3.3%	4.3%	2.2%	0.6%	2.6%	2.5%	4.0%	5.1%	4.6%	4.0%	3.3%	3.3%	2.9%	2.4%	3.0%	3.1%
South America	6.4	6.3	6.6	6.8	6.8	6.6	6.5	6.7	7.0	7.0	6.8	6.5	6.7	6.7	6.8	6.7	6.5	6.7	6.8	6.8	6.7	6.9
YoY Growth, net mb/d	0.3	0.2	0.2	0.3	0.2	0.3	0.2	0.1	0.2	0.2	0.2	0.0	0.0	-0.2	-0.2	-0.1	0.0	0.0	0.1	0.0	0.0	0.1
YoY Growth, %	4.3%	3.9%	3.9%	4.6%	3.7%	4.1%	3.5%	1.8%	2.6%	2.4%	2.6%	0.3%	-0.6%	-3.1%	-2.2%	-1.4%	-0.1%	0.2%	0.9%	0.3%	0.3%	2.0%
Mideast	7.8	7.7	8.1	8.4	7.8	8.0	7.9	8.4	8.6	8.2	8.3	8.0	8.7	8.9	8.6	8.5	8.2	9.0	9.1	8.8	8.7	9.0
YoY Growth, net mb/d	0.3	0.5	0.3	0.1	0.0	0.2	0.3	0.3	0.2	0.4	0.3	0.0	0.3	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2
YoY Growth, %	3.5%	7.3%	3.3%	0.9%	-0.5%	2.6%	3.5%	4.2%	2.2%	4.7%	3.6%	0.2%	3.9%	2.9%	4.6%	2.9%	2.5%	2.4%	2.4%	2.5%	2.4%	2.4%
Africa	3.6	4.0	3.7	3.4	3.8	3.7	4.0	3.8	3.7	3.9	3.9	4.2	4.0	3.8	4.1	4.0	4.3	4.1	4.0	4.3	4.2	4.4
YoY Growth, net mb/d	0.1	0.4	0.3	-0.1	0.1	0.2	0.0	0.1	0.3	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2
YoY Growth, %	2.7%	10.0%	8.3%	-2.4%	2.8%	4.6%	0.5%	3.5%	7.4%	2.6%	3.4%	4.8%	3.0%	3.0%	4.0%	3.7%	3.8%	4.2%	4.6%	4.5%	4.3%	4.3%

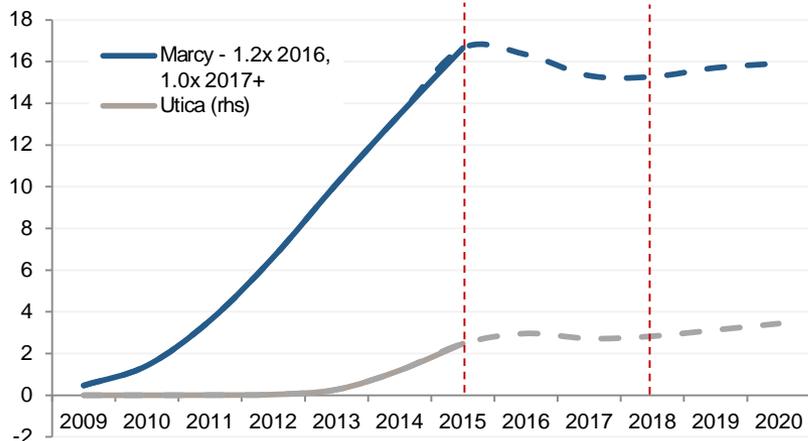
Natural Gas Macro



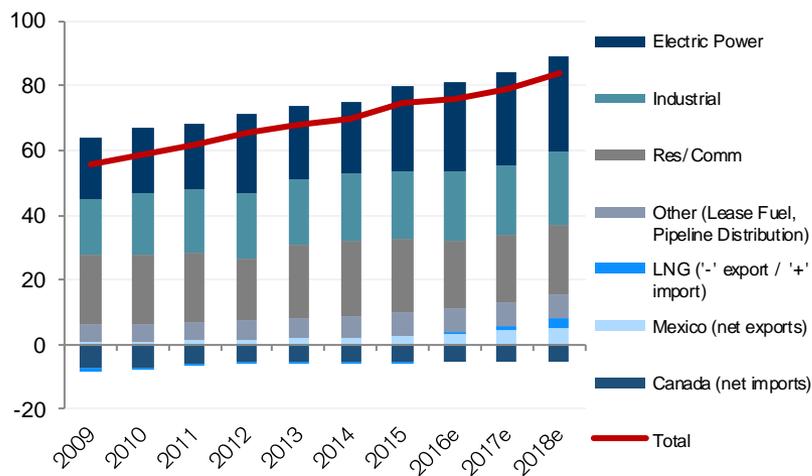
US Gas Prices Should Inflect Some 20% Above Strip

Framing a range, current prices in the \$1.80-\$2.50 MMBtu range are fundamentally too low

Picture of a thousand words:
North East supply at current strip (Bcf/d)



Demand forecast by component (Bcf/d)



Why US natural gas Hhub prices inflect in our forecast:

- We see solid and significant demand growth;
- Low prices have already taken away most of supply growth momentum;
- To regenerate supply growth, prices will have to inflect up again.
- We can frame an answer to the key question: How high Henry Hub prices will need to rise:

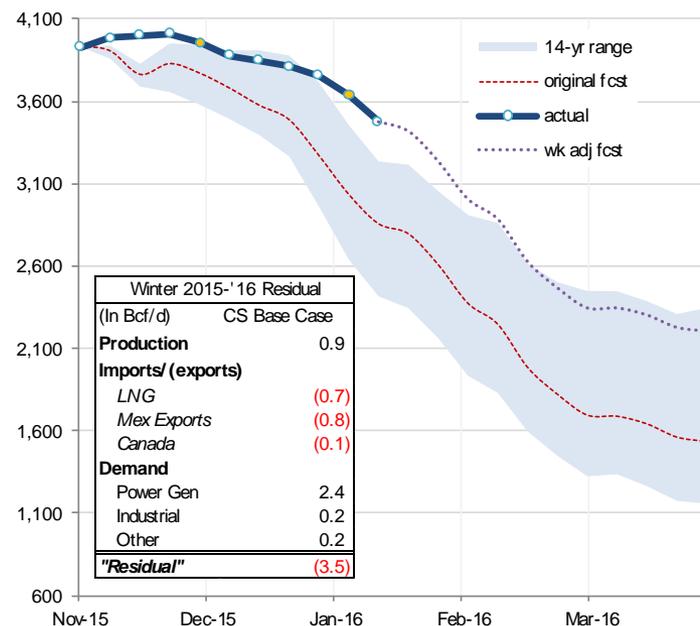
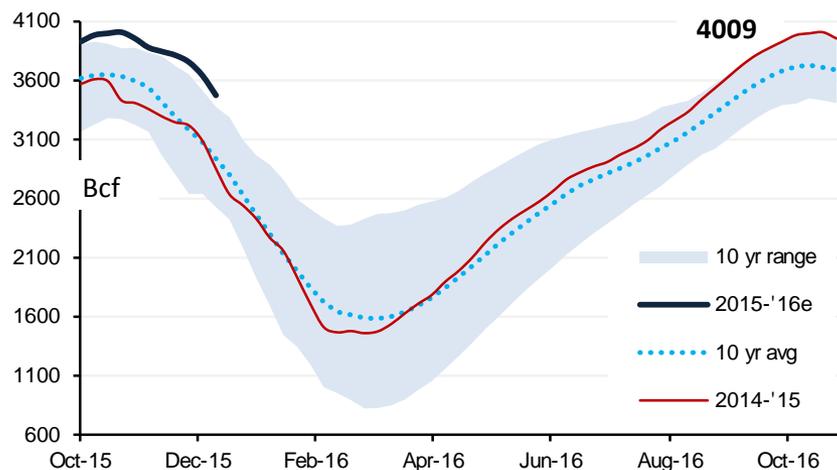
Natural Gas Forecast						
Period	Actuals & CS Forecast	Prior Forecast	Current Futures	New forecast relative to:		
(Actuals are bid week averages and forecasts Hhub futures)						
2011	\$ 4.03					
2012	\$ 2.80					
2013	\$ 3.67					
2014	\$ 4.37				prior	futures
Q1-2015	\$ 2.96					
Q2-2015	\$ 2.67					
Q3-2015	\$ 2.77					
Q4-2015	\$ 2.28	\$ 3.20		\$ (0.92)	-29%	
2015f	\$ 2.67	\$ 2.93		\$ (0.26)	-9%	
Q1-2016f	\$ 2.50	\$ 4.30	\$ 2.12	\$ (1.80)	-42%	\$ 0.38 18%
Q2-2016f	\$ 2.70	\$ 4.10	\$ 2.29	\$ (1.40)	-34%	\$ 0.41 18%
Q3-2016f	\$ 2.75	\$ 3.50	\$ 2.42	\$ (0.75)	-21%	\$ 0.33 14%
Q4-2016f	\$ 2.85	\$ 3.70	\$ 2.56	\$ (0.85)	-23%	\$ 0.29 11%
2016f	\$ 2.70	\$ 3.90	\$ 2.35	\$ (1.20)	-31%	\$ 0.35 15%
Q1-2017f	\$ 3.25	\$ 3.70	\$ 2.79	\$ (0.45)	-12%	\$ 0.46 17%
Q2-2017f	\$ 3.00	\$ 3.30	\$ 2.63	\$ (0.30)	-9%	\$ 0.37 14%
Q3-2017f	\$ 3.25	\$ 3.40	\$ 2.72	\$ (0.15)	-4%	\$ 0.53 20%
Q4-2017f	\$ 3.50	\$ 3.60	\$ 2.84	\$ (0.10)	-3%	\$ 0.66 23%
2017f	\$ 3.25	\$ 3.50	\$ 2.74	\$ (0.25)	-7%	\$ 0.51 18%
2018f	\$ 3.50	\$ 3.60	\$ 2.91	\$ (0.10)	-3%	\$ 0.59 20%
Long-Term	\$ 3.50	\$ 3.75		\$ (0.25)	-7%	

- We built bottom-up cash-flow and capex driven proprietary models of the key shale gas basins.

- We can now more confidently frame the sensitivity of future production from the Marcellus and Utica to futures prices.

Pushing the Limits of Pre-Winter Natural Gas Storage

First time ever storage exceeded 4 Tcf



HDDs	El Niño 1997-1998	1998-1999	1999-2000	2000-01	2001-02	El Niño 2002-03	2003-04	El Niño 2004-05	2005-06	El Niño 2006-07	2007-08	2008-09	El Niño 2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	El Niño 2015-16
November	0%	-2%	-16%	4%	-20%	12%	-4%	-3%	-5%	5%	-10%	8%	-8%	0%	3%	3%	6%	26%	-12%
December	-2%	-18%	-11%	22%	-22%	1%	-4%	1%	15%	-10%	5%	16%	7%	15%	-7%	-15%	12%	-6%	-48%
January	-13%	0%	-6%	14%	2%	-3%	-3%	-1%	-21%	-12%	-5%	9%	13%	13%	-8%	4%	6%	11%	
February	-23%	-24%	1%	-2%	-15%	7%	17%	-5%	-13%	20%	7%	0%	7%	6%	-14%	-1%	22%	7%	
March	-39%	2%	-22%	5%	2%	11%	-1%	9%	7%	2%	11%	-1%	-5%	-1%	-22%	14%	16%	12%	
Winter Average	-20%	-15%	-9%	13%	-9%	4%	3%	0%	-6%	0%	5%	6%	4%	8%	-9%	0%	15%	9%	
Gas Price	\$ 2.40	\$ 1.93	\$ 2.52	\$ 6.19	\$ 2.38	\$ 5.29	\$ 5.14	\$ 6.69	\$ 10.98	\$ 6.66	\$ 7.50	\$ 5.92	\$ 4.73	\$ 4.20	\$ 3.19	\$ 3.35	\$ 4.27	\$ 3.35	

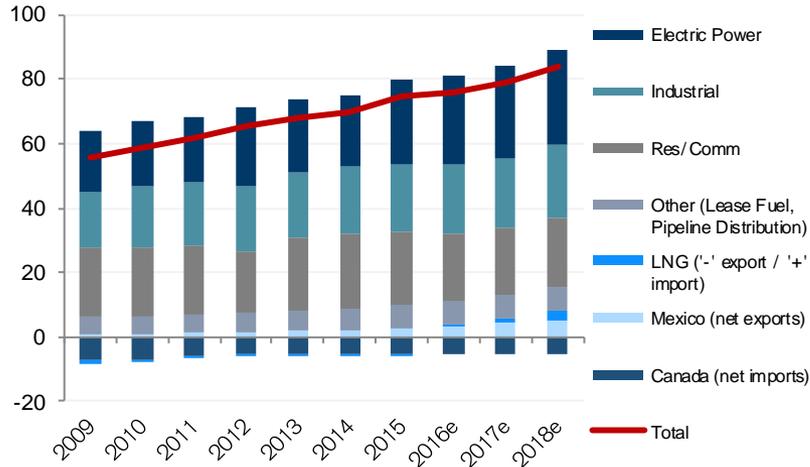
Actual draws with a heat map across across the same 19 years but done by month

withdrawals Bcf	El Niño 1997-98	1998-99	1999-00	2000-01	2001-02	El Niño 2002-03	2003-04	El Niño 2004-05	2005-06	El Niño 2006-07	2007-08	2008-09	El Niño 2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	El Niño 2015-16
Nov	189	31	32	288	-73	198	87	64	8	48	121	57	-33	74	-38	125	211	161	-25
Dec	533	436	543	720	352	560	474	571	552	343	569	513	694	665	383	385	714	286	124
Jan	468	624	782	496	546	840	815	713	264	683	824	705	811	799	544	721	971	725	
Feb	291	321	450	339	464	677	603	429	485	732	593	372	619	584	460	604	728	741	
Mar	246	297	152	183	320	135	104	285	200	50	219	93	31	146	-35	380	353	194	
total	1727	1709	1959	2026	1610	2410	2083	2061	1509	1857	2326	1740	2122	2269	1315	2215	2977	2107	

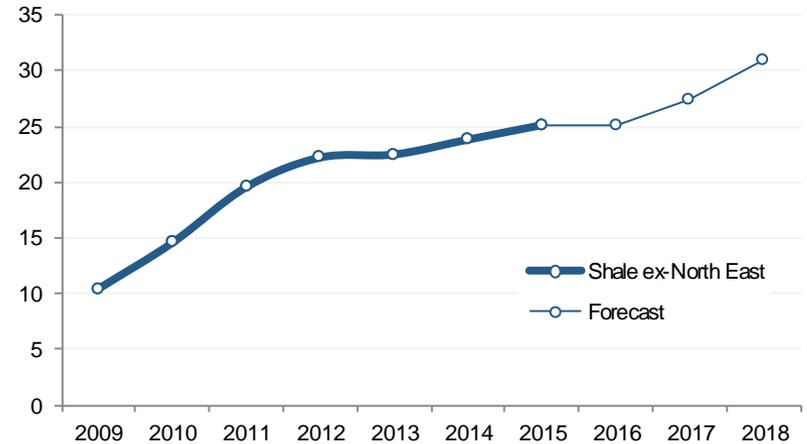
Northeast Must Grow by ~3.5 Bcf/d to Balance Demand

Marcellus and Utica are best positioned to add required production growth

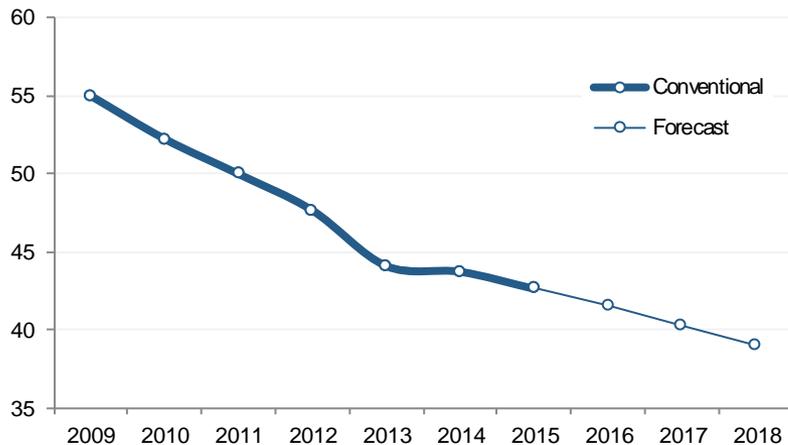
Demand growth by segment (Bcf/d)



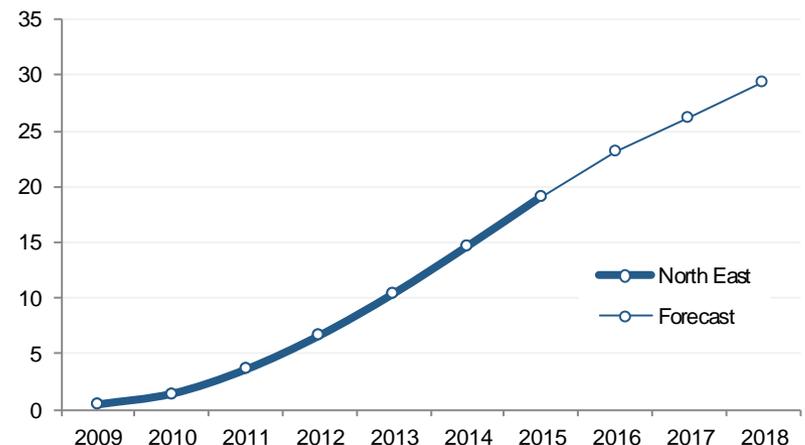
Excluding the Marcellus and Utica, shale production has been flat (Bcf/d)



Conventional production should continue to decline (Bcf/d)



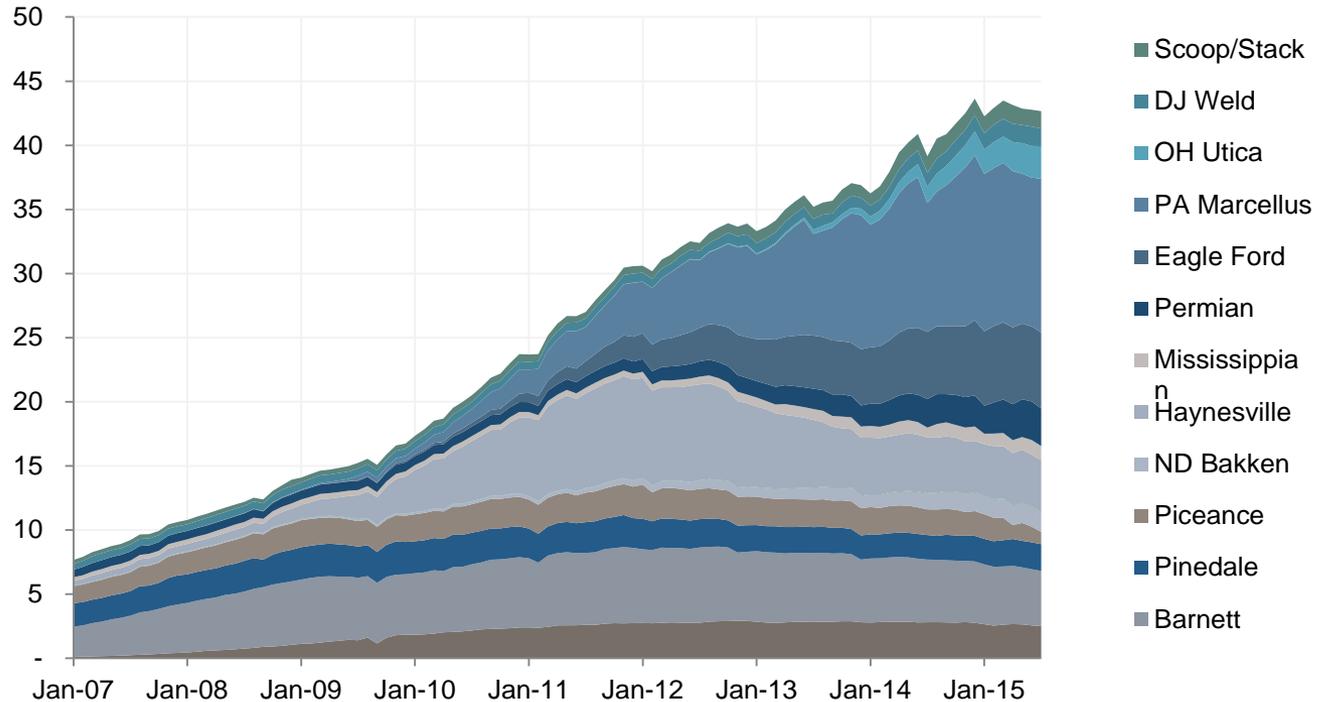
North East shale must continue growth to meet demand (Bcf/d)



Shale Gas Has Come to Dominate US Gas Supply...

Marcellus and Utica gas volumes estimated to be up 32% in 2015, or 3.7 Bcf

Other than associated gas production the only gas-focused region that has delivered material growth is Appalachia



Northeast gas supply, much like US onshore oil has been resilient in 2015.

- Well productivity continues to improve and early results in the dry Utica suggest another low cost source of natural gas

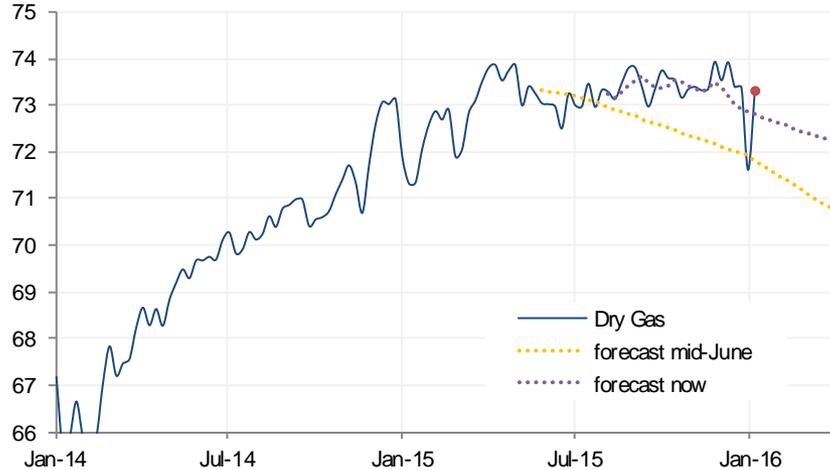
We argue that 3 Bcf+ of gas NE gas growth per year through 2018 is required from Appalachia to keep up with demand and we do not think that can happen at the strip.

- NGL pricing has been a significant driver of historical growth and the “NGL carry” has been eliminated with weak C3+ pricing
- This has driven a shift toward more productive dry gas activity – but we do not think the strip generates enough cash flow to reinvest in new dry Marcellus/Utica drilling with NE producer balance sheets as stretched as they are

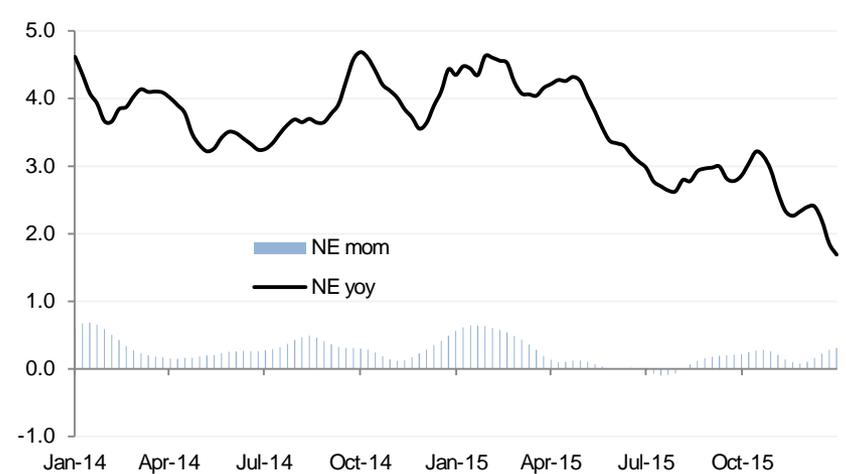
... And the Northeast Has Come to Dominate Shale

Production growth and momentum in the northeast remain resilient

Resilient dry gas supply and CS forecast of 6 and 2 months ago (Bcf/d)



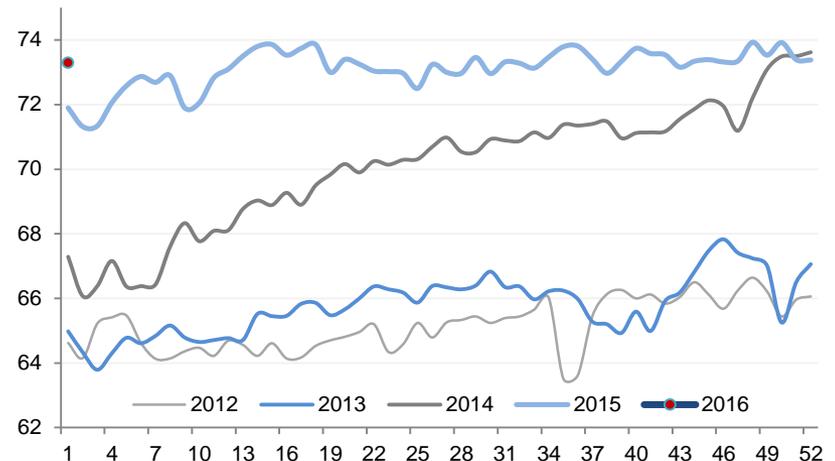
Weekly growth of supply from Marcellus and Utica from Jan 2014 (gross, Bcf/d)



We no longer expect production to roll in Q1 2016:

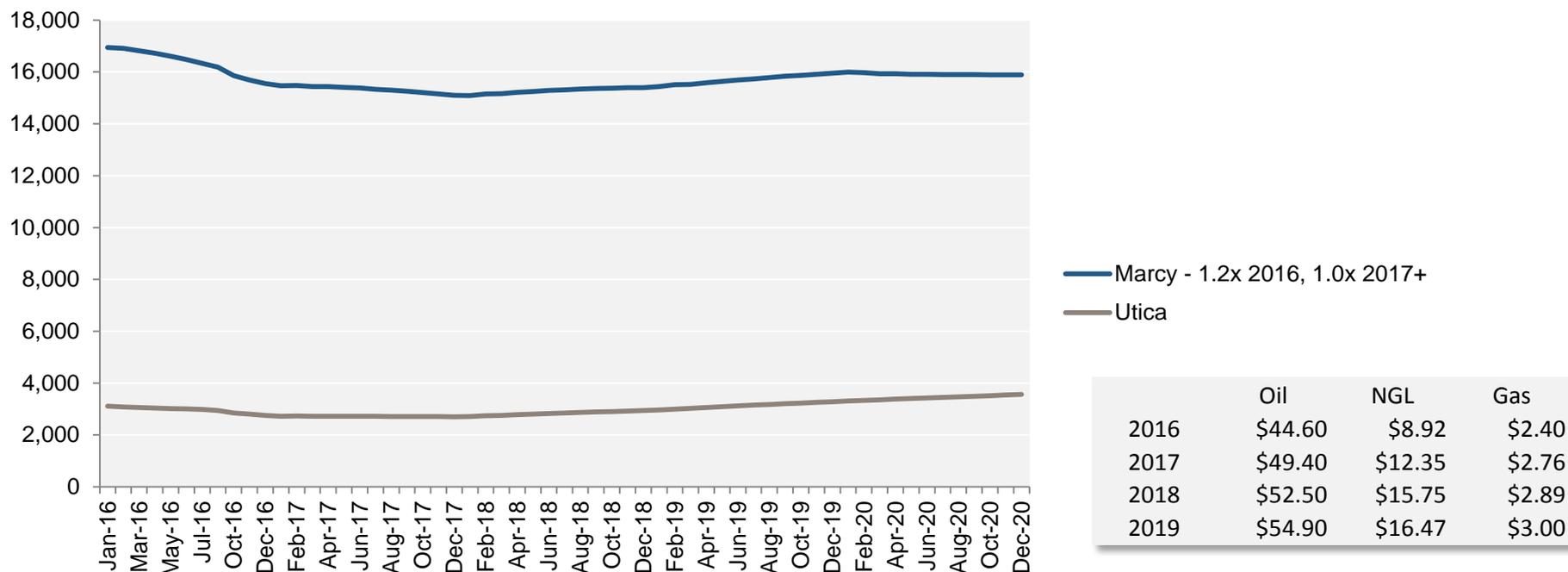
- While we now agree that production will likely not yet be in deficit yoy in Q1, demand for power, at these prices is strong.
 - All told, however, mild weather now leads to an end of season residual storage fill well north of 2 Tcf
- Net net, it is fair to say that the fundamental reason that prices have cratered remains the more than ample supply growth
- But the engine of that growth is losing momentum (Marcellus + Utica)
- This engine will need to restart to meet increasing demand from power gen, industrial, and exports

Dry gas production for the last 4 years clearly has lost momentum and the yoy surplus has halved since the first quarter... (Bcf/d)



The Gas Strip Does Not Support Required NE Growth

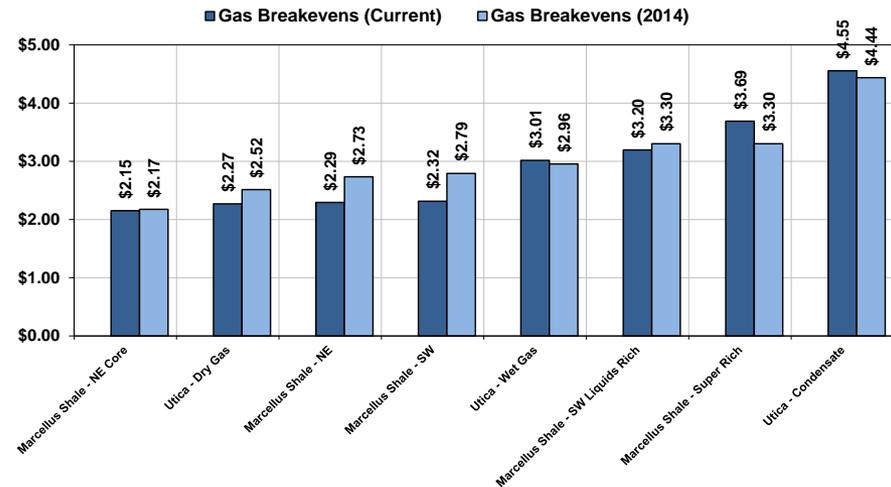
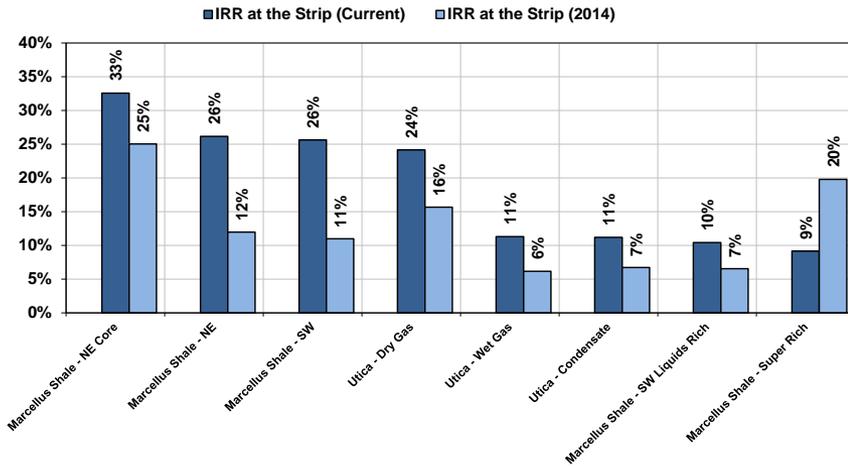
Assuming a 20% outspend in 2016 and spending with in cash flow in 2017+ we do not see the strip supporting robust NE growth



- While NE returns particularly in the dry Utica and Marcellus remain robust we do not see current basin cash flows supporting enough reinvestment to deliver growth.
- Assuming a 20% outspend in 2016 at the futures strip we estimate 8% and 11% declines in the Marcellus and Utica, respectively and would not expect to see any regional growth through 2018.

NE Economics Are the Best, but Even They Need Cash-Flow

Dry Utica and Marcellus Returns are 25%+ at the Strip and Break Even at ~\$2.30/MMBtu



Year:	2015	2016	2017	2018	2019	2020	2021	2022+
WTI Oil:	\$40.39	\$45.50	\$49.99	\$52.83	\$55.20	\$56.90	\$56.90	\$56.90
NYMEX Gas:	\$2.21	\$2.40	\$2.76	\$2.91	\$3.01	\$3.13	\$3.13	\$3.13

Source: Company data and Credit Suisse estimates

Futures strip as of: 12/4/2015

Breakeven Scenario	per Bbl
WTI Oil:	\$45.00

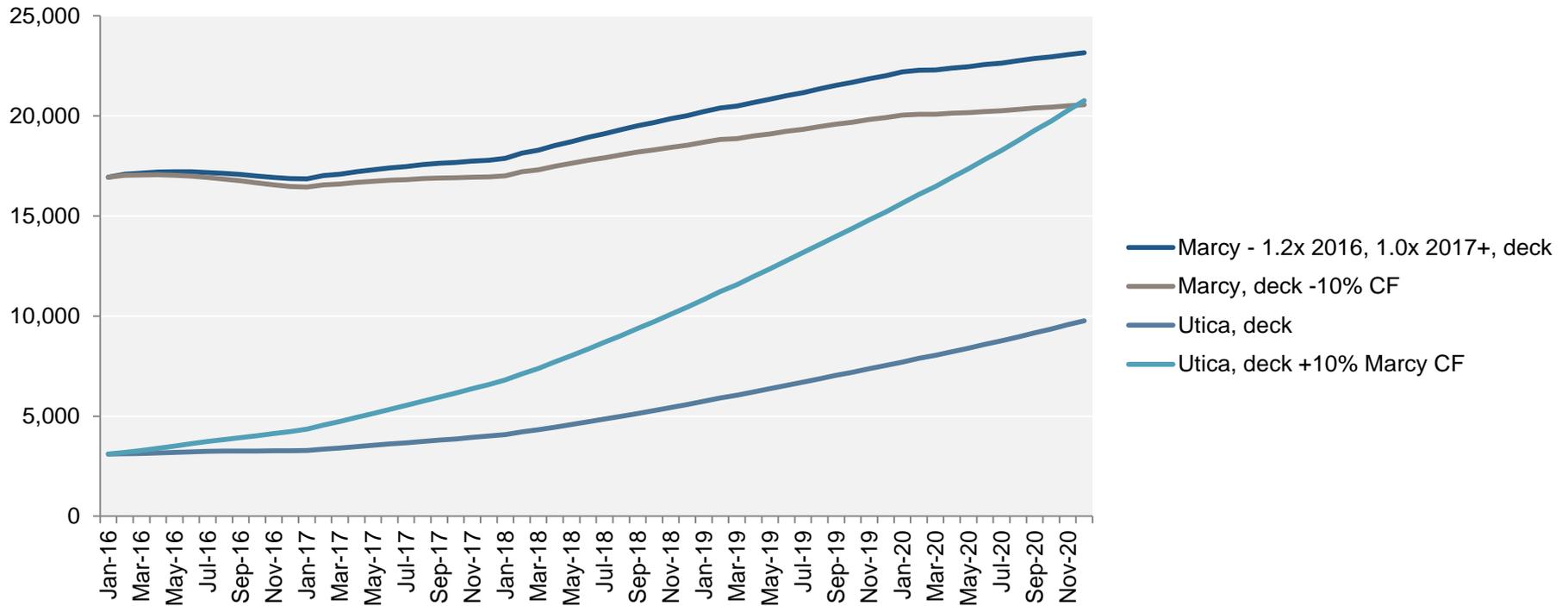
Source: Company data and Credit Suisse estimates

NE liquids returns have taken it on the chin but dry gas returns are still robust

- We estimate dry gas Utica and Marcellus returns are still ~25%
- Dry gas breaks even at \$2.30/MMBtu assuming a 15% ATAX IRR
- Wet gas returns are now in the 10-13% range and require greater than \$3/MMBtu gas to break even, assuming \$45/bbl crude and \$9/bbl NGLs

However, Too Much Cash-Flow Begets Too Much Growth

At our new deck we estimate the NE could deliver ~9 Bcfe of growth through 2018



- Assuming 20% outspend in 2016 and spending with in cash flow in 2017+, and Marcellus cash flows are reinvested only in the Marcellus, as well as Utica cash flows reinvested in the Utica, we estimate the region would deliver 5.5 Bcfe of growth through YE18
- Assuming 10% of Marcellus cash flow is reinvested in the Utica we estimate the region would deliver ~9 Bcfe of growth through YE18

Pipes Should Not Limit NE Production or Mexican Exports

Our MLPs team compiled a list of infrastructure slated for 2016-18 initial service

Project	Geography	Start Point	End Point	Incremental Capacity (MMcf/d)	Estimated In-service Date
Gulf Coast Mainline	REX interconnection at Moultrie, IL to Gulf Coast	Moultrie County, IL	Texok, TX	750	3Q 2016
Constitution		Susquehanna County, PA	Schoharie County, NY	650	4Q 2016
Lebanon West II	Butler County, PA to Lebanon, OH	Butler County, PA	Lebanon, OH	130	4Q 2016
Northern Access 2016	South Via Atlantic	Sergeant Township, PA	Wales, NY	350	4Q 2016
REX Reversal (Rockies Express Pipeline)	Midwest Via Ohio	Clairington, OH	Meeker, CO	1900	4Q 2016
Gulf Markets Ph1	Texas, Louisiana, Mississippi, Tennessee, Kentucky, Ohio, & Pennsylvania	West Virginia	Louisiana	250	4Q 2016
2016 Incremental Take away				~ 4000	
Sunbury		Lycoming, PA	Snyder County, PA	200	1Q 2017
Nexus Gas Transmission	OH using Vector to Dawn Hub Ontario	Stark, OH	SE Michigan	1500	2Q 2017
Rover	Marcellus to Defiance, OH and Sarnia, Canada	Cadiz, OH	Defiance, OH	3250	3Q 2017
Atalantic Sunrise	Northeastern PA to Mid-Atlantic and southeast	Leidy, PA	Station 85, Alabama	1700	4Q 2017
TGP Northeast Upgrade	PA and NJ	Bradford County, PA	New Jersey	600	4Q 2017
Adair Southwest	Pennsylvania, West Virginia, ohio, Kentucky	Fairfield, OH	Adair, KY	200	4Q 2017
Access South	Gulf Via Ohio	Uniontown, PA	Kosciusko, MS	320	4Q 2017
Lebanon Extension Project		Uniontown, PA	Lebanon, OH	622	4Q 2017
Susquehanna West Project	Susquehanna region in Pennsylvania.	Tioga County	Tioga County	145	4Q 2017
Leach Xpress / Rayne Xpress	Ohio, West Virginia	Majorsville, WV	ML Pool, Rayne, LA	1500	4Q 2017
Penn East Pipeline		Luzerne, PA	Mercer, NJ	1000	4Q 2017
2017 Incremental Take away				~ 11000	
Mountain Valley	Wetzel Country, WV to Transcontinental Gas Pipeline Company's Zone 5 compressor Station 165 in Pittsylvania County, VA	Bradshaw, WV	Pittsylvania County, VA	2500	4Q 2018
Mountaineer Xpress	West Virginia	Marshall County, WV	Wayne County, WV	2700	4Q 2018
WB Xpress		West Virginia	Virginia	1300	4Q 2018
Atlantic coast	Buckingham Country, Va Parcel	Lewis County, WV	Northhampton, NC	1500	4Q 2018
2018 Incremental Take away				~ 8000	

Project	Incremental Capacity (MMcf/d)	Estimated In-service Date
Los Ramones Phase 2	1400	Dec-15
Roadrunner Phase 1	170	1Q 2016
Roadrunner Phase 2	400	1Q 2017
2016-'17 Incremental Takeaway (firm)	~ 2000	
Waha - San Elizario	1100	1Q 2017
Tuxpan Tula	886	4Q 2017
Trans Pecos	1400	1Q 2017
Columbia Escobedo	505	2Q 2017
Nueva Era Pipeline	600	3Q 2017
2017 Additional Takeaway (less firm)	~ 4500	

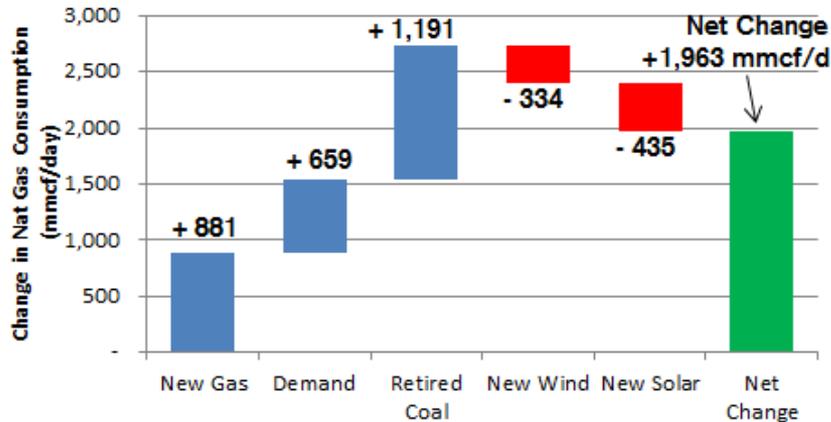
We do not see a significant infrastructure constraints:

- With ~24 bcf/d of incremental takeaway capacity coming online in the next three years, the Marcellus and Utica face fewer infrastructure constraints on getting gas to higher priced markets— which, of course, enlarges margins.
- Note that certain pipes have been excluded to avoid double counting North East take away capacity.
- Likewise, exports to Mexico are not constrained by infrastructure. Already the existing infra-structure is underutilized and actual increments of final demand determine low/utilization.

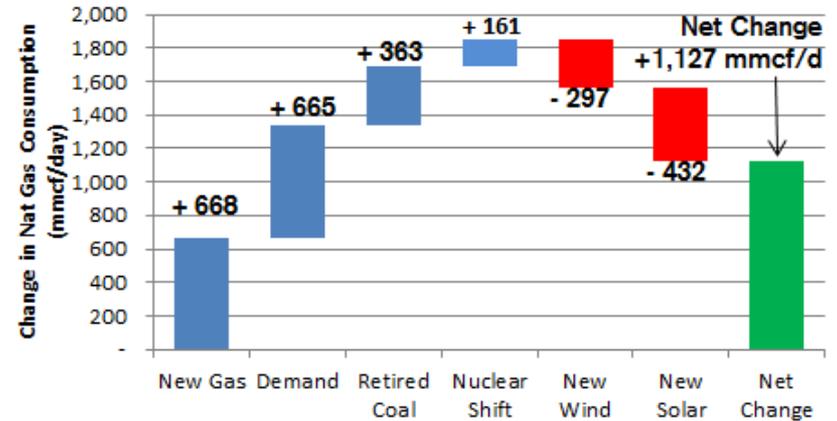
Power Generation: Replacing Coal and Balancing

Our utilities team's forecast for growth in electricity based natural gas demand

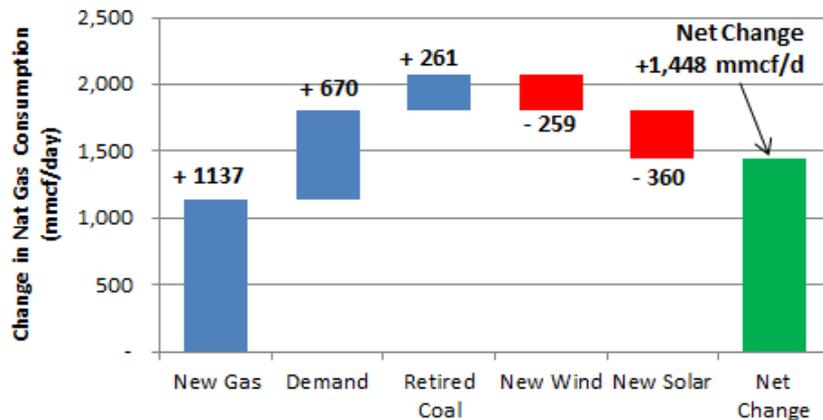
2016 natural gas demand growth breakdown for power generation



2017 natural gas demand growth breakdown for power generation



2018 natural gas demand growth breakdown for power generation



By these estimates, our demand forecast is conservative.

- We forecast power gen natural gas demand growth of 1.6, 0.8, and 0.8 bcf/d in 2016, 2017, and 2018, respectively.
- While we now agree that production will likely not yet be in deficit yoy in Q1, demand for power, at these prices is strong, and normal weather in Q1 means that our storage model ends winter at 1.8Tcf in the ground.
- However, any real price gains in the balance of the year risk deflating power demand, which grew especially fast this year; the more so since coal costs are still deflating as well.

LNG Exports Should Grow by ~3.5 Bcf/d Over Next 3 Years

With new demand from abroad, the US turns into a net exporter in 2017

LNG export demand by terminal (Bcf/d)

	2015	2016	2017	2018	2019	2020
Sabine Pass	-	7.0	9.0	16.6	16.6	16.6
Cameron	-	-	-	6.0	9.0	11.0
Freeport	-	-	-	2.4	7.2	8.8
Corpus Christi	-	-	-	-	2.3	6.8
Cove Point	-	-	-	1.0	2.0	5.9
Capacity (Mtonne)	-	7.0	9.0	26.0	37.0	49.0
US gas demand equivalent (Bcf/d)		0.6	1.3	3.7	5.3	7.0

note:

Tonne of LNG to Bcf/d multiply by 0.125

Feedgas requirement, rule-of-thumb = 115% of capacity

We assume 2016 utilization of 60%

Weak global LNG markets are a concern; our central case assumes 60% utilization next year

- Utilization of available capacity grows from 60% in 2016 to ~90% in 2018, in our central case.
- Our LNG 'demand' projection may still be optimistic, even if 90% of the capacity of the liquefaction trains under construction are 'pre-sold'; the outlook for LNG spot markets is exceptionally bleak.
- **For reference, rules of thumb, maximum Henry Hub prices at which LNG export terminals would flow to Europe or Asia**, (assuming that terminals would flow if netback revenue exceeds cash-operating costs):
 - American LNG could flow to Europe at Henry Hub **\$2.70 MMBtu** (based on our team's UK spot price forecast).
 - and to Japan at Henry Hub **\$2.10 MMBtu** (based on our team's Japan LNG spot price forecast for 2016).

Surging Supplies Have Collapsed NGL Markets

Going forward, we think that Ethane stays connected to Henry Hub gas while LPGs and heavier NGLs should (re-)connect with global oil

The key for Ethane remains the overwhelmingly large cut of this precious liquids in the Marcellus and Utica. Its use is limited and infrastructure expensive. In our view, new demand is expensive and takes time to build out leading to a structurally over-supplied market, barring a lasting supply shift.

In a similar way, LPG prices fell to new record lows – on a relative-to-WTI/naphtha basis – this year. Surging supplies have simply saturated North American capacity-of-use. Infrastructure and export capacity build-out is underway, however.

- So, different to Ethane, international oil-linked chemical and utility markets are a fairly in-expensive tanker voyage away.

NGL Prices & Forecasts									
<small>(Actual bidweek)</small>									
Period	Ethane (cts/ gl)	As % of Ngas	Propane (cts/ gl)	Butane (cts/ gl)	Pentane (cts/ gl)	NGL		NGL	
						Composite Mt Belvieu	As % of WTI	Composite Northeast	As % of WTI
2013	27	99%	101	137	217	\$30.78	32%	\$25.74	26%
Q1-2014	32	89%	125	135	224	\$34.48	34%	\$29.44	29%
Q2-2014	29	88%	106	128	223	\$31.62	31%	\$26.58	26%
Q3-2014	24	79%	103	122	210	\$29.17	31%	\$24.13	25%
Q4-2014	21	73%	71	91	139	\$21.43	32%	\$16.39	25%
2014	27	83%	101	119	199	\$29.18	32%	\$24.14	26%
Q1-2015	19	87%	54	65	125	\$17.43	36%	\$12.39	26%
Q2-2015	19	96%	48	60	127	\$16.69	28%	\$11.65	19%
Q3-2015	19	94%	43	57	101	\$15.14	32%	\$10.10	21%
Q4-2015f	17	103%	42	62	97	\$14.71	35%	\$9.67	23%
2015	19	95%	46	61	112	\$15.99	32%	\$10.95	22%
2016f	19	95%	44	67	128	\$16.68	30%	\$11.64	21%
2017f	23	95%	60	75	143	\$20.14	32%	\$16.07	25%
2018f	25	98%	71	79	150	\$22.21	33%	\$18.13	27%
Long-Term	25	98%	85	93	161	\$24.56	35%	\$20.48	29%

Details of the Composition of Our NGLs Forecast

Clearly all American NGLs prices have hit lows relative to history and relative to oil or gas markets in 2015.

A recovery in relative value, at least, has much to do with low WTI prices.

- We expect that in terms of relative value to WTI, the composite barrel's worth in Mount Belvieu, TX, will stay in the low to mid-30% – but of course its recovery back into this range has as much or more to do with the collapse in WTI prices over the summer.
- The story is worse when considering net backs to Northeast producers, whose cost of transport of ethane especially has eroded the value of that NGL barrel to barely 20% of WTI.
 - A recovery to that Northeast netback hinges on transport infrastructure. We assume that propane's transport costs should fall to ~4 cents/gallon after next year. And that even for Northeast producers the composite barrels worth reaches near 30% of WTI again in the longer run.

History and assumptions and likelihood of forecast of the different components of US NGLs

	location	unit	composite (share of ...)	2014				2015				2016				2017				2018		LR			
				Q1	Q2	Q3	Q4	Avg	Q1	Q2	Q3	Q4	Avg	Q1	Q2	Q3	Q4	Avg (e)	Q1	Q2	Q3	Q4	Avg (e)	LR	
Natural Gas	Henry Hub	\$/MMBtu		\$4.90	\$4.56	\$4.07	\$3.96	\$4.37	\$2.96	\$2.67	\$2.77	\$2.28	\$2.67	\$2.50	\$2.70	\$2.75	\$2.85	\$2.70	\$3.25	\$3.00	\$3.25	\$3.50	\$3.25	\$3.50	\$3.50
Ethane	Mt Belvieu	cts/gl	57%	32	29	24	21	27	19	19	19	17	19	17	19	19	20	19	23	21	23	24	23	25	25
(as % of Ngas)				89%	88%	79%	73%	83%	87%	96%	94%	103%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	98%	98%
(refas % of WTI)				13%	12%	10%	13%	12%	16%	13%	17%	17%	16%	15%	14%	13%	13%	14%	15%	14%	15%	16%	15%	16%	15%
Propane	Mt Belvieu	cts/gl	23%	125	106	103	71	101	54	48	43	42	46	34	40	50	52	44	60	60	60	60	60	71	85
(as % of WTI)				52%	44%	45%	45%	47%	46%	33%	38%	42%	40%	30%	30%	35%	35%	33%	40%	40%	40%	40%	40%	45%	50%
Butane (Hiso)	Mt Belvieu	cts/gl	11%	135	128	122	91	119	65	60	57	62	61	57	66	71	74	67	75	75	75	75	75	79	93
(as % of WTI)				56%	52%	54%	57%	55%	56%	42%	51%	62%	52%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	55%
Pentane	Mt Belvieu	cts/gl	9%	224	223	210	139	199	125	127	101	97	112	107	126	136	141	128	143	143	143	143	143	150	161
(as % of WTI)				93%	91%	93%	88%	91%	108%	89%	90%	97%	96%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
NGL Composi	Mt Belvieu	cts/gl	100%	34	32	29	21	\$29	17	17	\$15	\$15	\$16	\$14	\$16	\$18	\$19	\$17	\$20	\$20	\$20	\$21	\$20	\$22	\$25
(as % of WTI)				34%	31%	31%	32%	32%	36%	28%	32%	35%	32%	30%	29%	30%	30%	30%	32%	31%	32%	32%	32%	33%	35%
NE NGL Composite*				29	27	24	16	\$24	12	12	\$10	\$10	\$11	\$9	\$11	\$13	\$14	\$12	\$16	\$16	\$16	\$16	\$16	\$18	\$20
(as % of WTI)				29%	26%	25%	25%	26%	26%	19%	21%	23%	22%	19%	20%	21%	22%	21%	25%	25%	25%	26%	25%	27%	29%
NE ethane transport assumption				15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
NE propane transport assumption				15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	5	5	5	5	5	5	5
WTI	Cushing			\$101	\$103	\$95	\$67	\$91	\$49	\$60	\$47	\$42	\$49	\$48	\$56	\$60	\$63	\$56	\$63	\$63	\$63	\$63	\$63	\$66	\$71

Reference Data



Money Flows and Positioning: Sidelining Fundamentals

When fundamentals get trumped

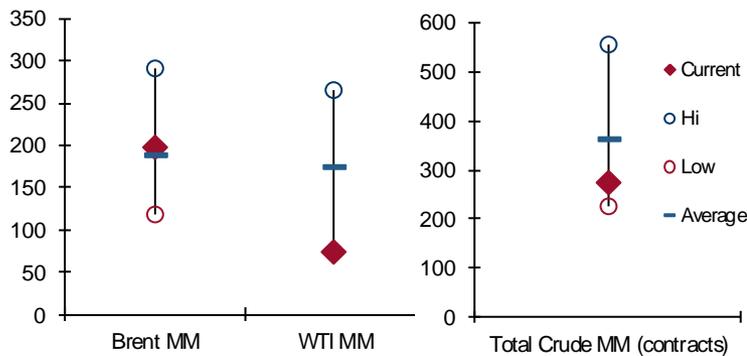
The H2-2015 melt-down was not only about length bailing out. New sellers flocked to both Brent and WTI futures – including their long-end ...

Positioning in Managed Money (spec category) is short WTI

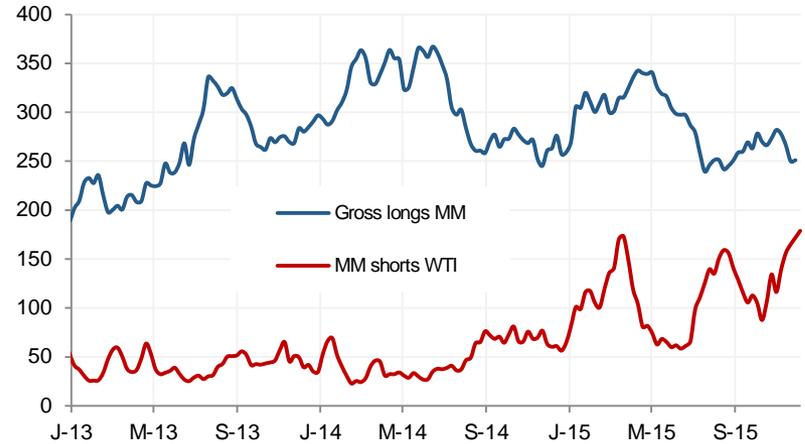
- In the below positioning snapshot, net length of the MM category had fallen to a near record. Brent positioning is, in contrast, just about average. The combined position is near a record low, and this covers a 52-week span during which it mostly paid to be short ...
- More length has come out of the WTI complex
- In Brent, however, gross length is in at the upper end of the range, which probably reflects the WTI-Brent arb position more so than a directional bet ...

More interesting still is the sharp increase in short MM positions since June

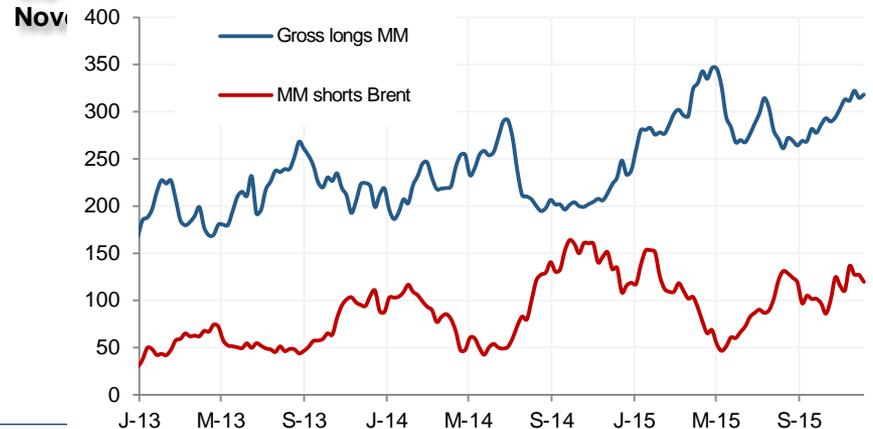
- Clearly waves of speculative selling have come through these markets
- Another wave of selling began in early November



WTI Longs have left the building; its shorts built through April, left in May-June and returned in force in July, left again and ramped to almost record size



The long Brent leg of a favorite WTI-Brent trade should have been carrying the day were it not for the rebuilding of large MM short positions in Nov

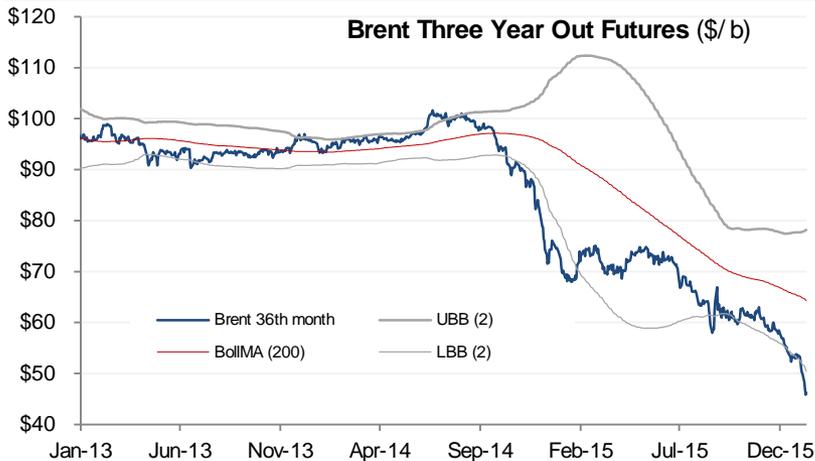


Money Flow: Selling the Long-Dated Futures

Signals from futures — selling down to a lower “new normal”

Clearly the view that \$50 is the new normal is being embraced by speculators with deep pockets. A proxy for future ‘normal’ we think is the long-dated futures market, which has surprising depth and sees a fair amount of daily volume. Go three years out, and much of that flow will not be “commercial”

Brent month 36 (three year out), sold off hard and zig-zagged wildly

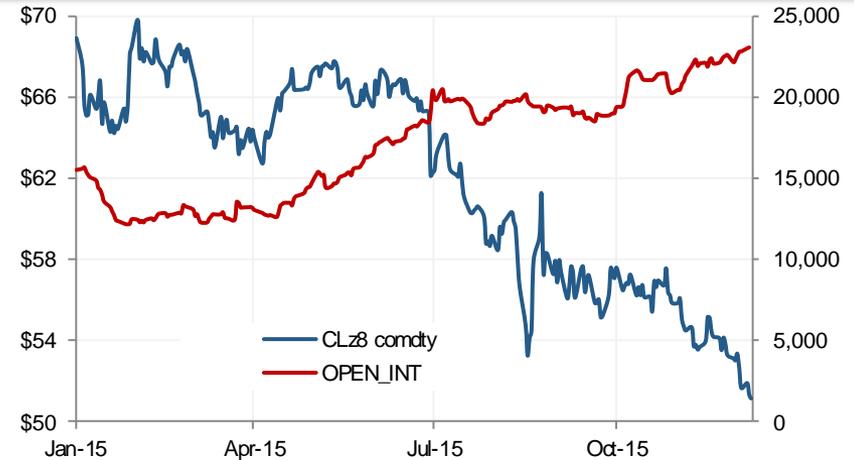


Renewed selling in 2H-2015 erased Brent \$60/b as “oil’s new normal”

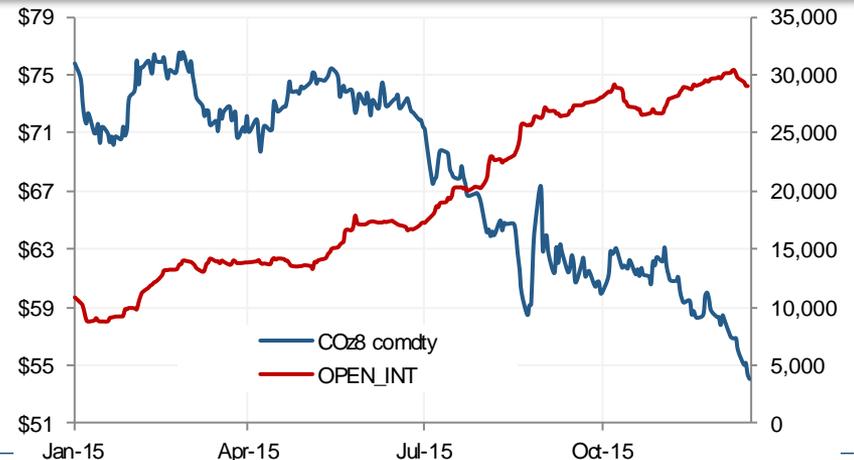
We have written before that Brent or WTI three year out contracts (the December 2018 contract currently) are fair indicators of the projected price required to replace the longer run marginal barrel

- From that perspective it was, we think, significant that long-dated prices did not fall below \$65 Brent for any length of time even in the depths of the GFC in early 2009, or earlier this year.
- In 2H, the long end was sold all the way down to near \$50/b (Brent), which was even more significant than the prompt price setting new lows
- This was also the single biggest “surprise” relative to our January forecast

In WTI new sellers have gradually raised their game at the long end ...



But more aggressive selling has come from speculative selling of Brent Dec 18



We will be keeping a close eye on the signals coming from the far end of the curve ...

Source: CS Research, Bloomberg

Opec the-Regulator-That-Left: Or, What's Next

Here is what we wrote in January 2015: “Oil exporters probably did not think markets would react this badly and seem to want an intervention. Indeed such pressure is building. Saudi Arabia has been very clear, however, that it wants markets “to go stabilize themselves”. And we think that the question [remains]: ‘What might persuade the Kingdom to sanction an Opec-led intervention?’” Note that we don’t have to change much to this phrasing ...

Put differently, until Saudi Arabia says ‘enough’, the noise about Opec acting is just that, noise.

The question is political. When will the pressure from constituents in the kingdom or pressure from other producers sway the Saudi top, or can it?

- Financially, the kingdom remains in good shape: it built up reserves of about \$750 billion through October of last year; its sovereign debt is still a measly 3% of GDP; and its younger generation of rulers has demonstrated that it can and will tap debt markets, who knows, might even un-peg the currency
 - Put different, while reserves have shrunk to ~\$650 billion, according to tallies by Reuters and Bloomberg, the simple arithmetic of dividing that number by an estimate of the per-month burn-rate of reserves we think is an all but useless exercise for the next year or so

Many Opec members are evidently not in Saudi Arabia’s fortunate financial position. Only Qatar, Kuwait, Angola and the UAE (in order) have by most estimates a lower budget break-even oil priced than does the Kingdom.

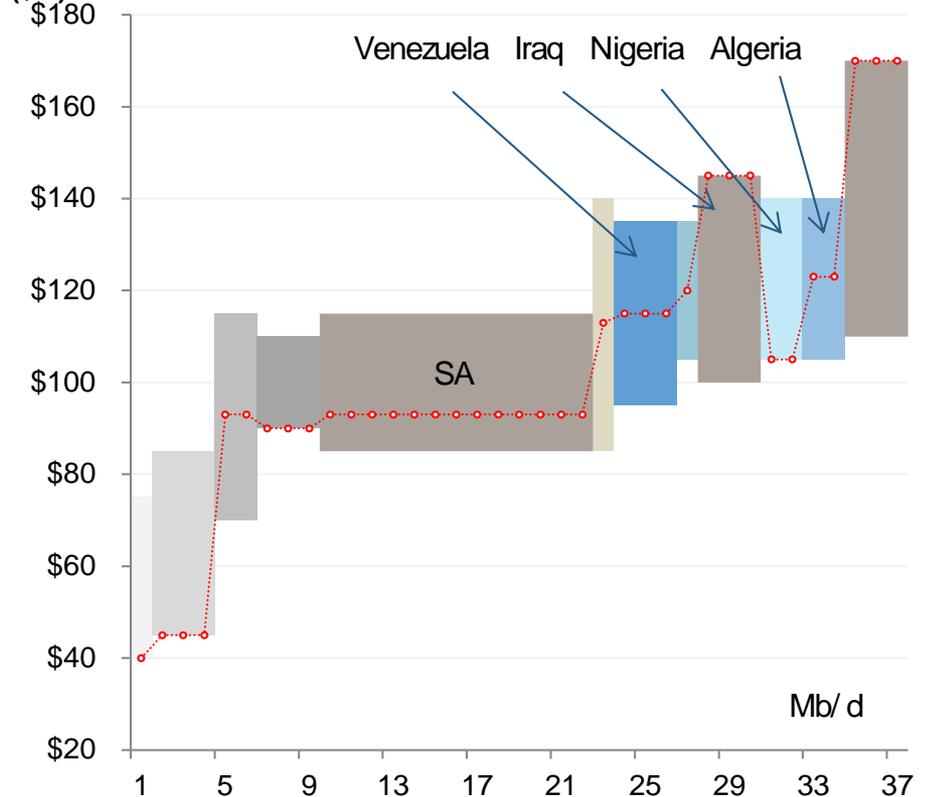
At the other extreme, Iran appears to require the highest oil price, but stands to get an infusion of cash next year

Nonetheless, the current low-oil-price strategy hurts the Kingdom as well and comes back to another question:

“What is the next phase in the Saudi oil strategy”

Might they decide to flow more from existing capacity, or even build another slug of new capacity ...?

Questionable relevance in the shorter term of cost-curve type exercises when gauging changes in sovereign producer behavior: Ranges of Opec government budget break-even-prices — for completeness’s sake (\$/b)



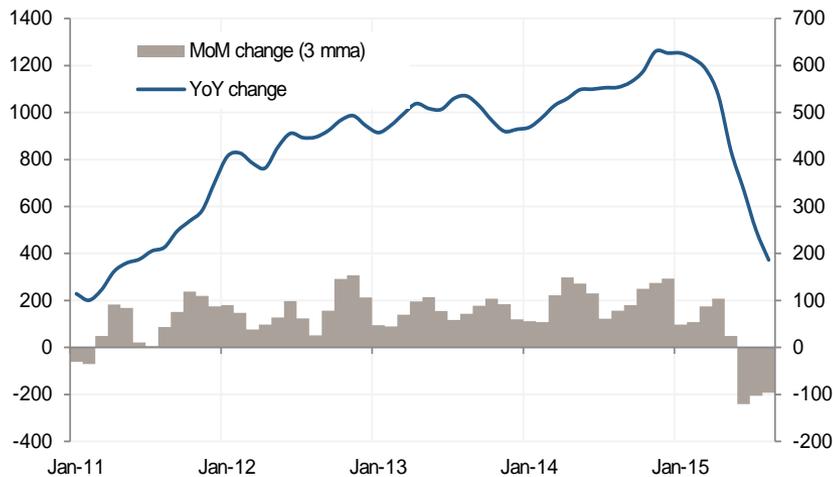
US Production Momentum – EIA Shale Productivity Report

We like this tool. It is timely, internally consistent and gives a complete picture of all the key shale basins. We use it to forecast Q4-2015 trajectories.

Shale production growth is fading

- The below chart clearly shows the acceleration of growth of US shale oil production in 2014
- Equally clearly, that growth has begun to roll
- The data are imperfect but the idea is clear

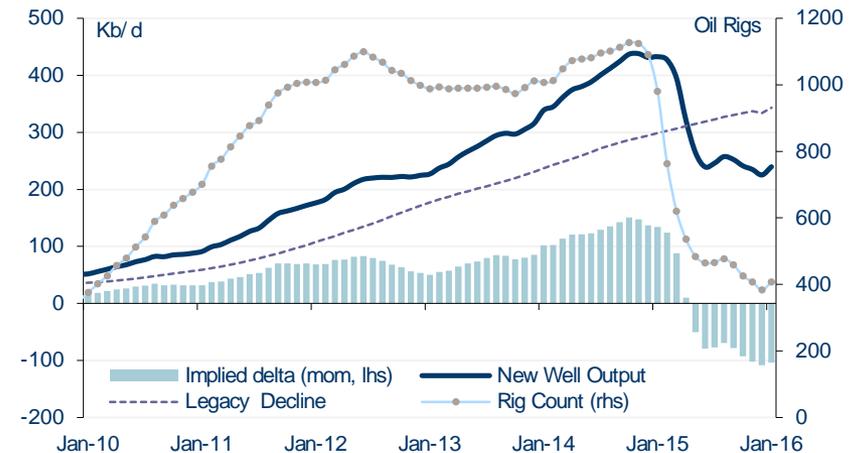
Changes of aggregate oil production from the Bakken, Eagle Ford, Niobrara and Permian shale basins (through October, Kb/d)



Because the rig count has plunged by half

- With fewer than 800 rigs drilling for oil in the four big plays in February, new oil additions fell below legacy decline, for the first time in 5 yrs
- US oil supply is slipping mom, as predicted

The monthly count of rigs drilling for oil in these plays set against: new well output, legacy decline, and the implied month-over-month delta of US shale oil supply (through October, Kb/d)

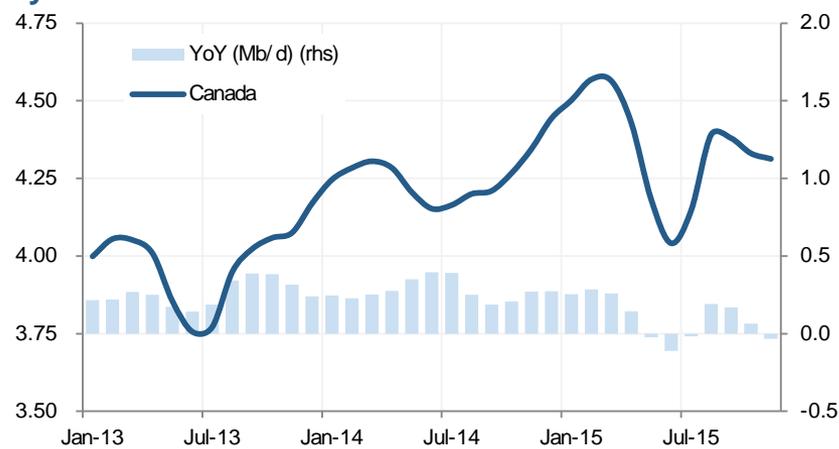


Supply Trends In Other Key Non Opec Producers

Simple charts to indicate what production is doing in key non-Opec categories

Where is the growth? Where is it not? Who is in decline? Charts of oil supply (i.e. all liquids including NGLs and biofuels)

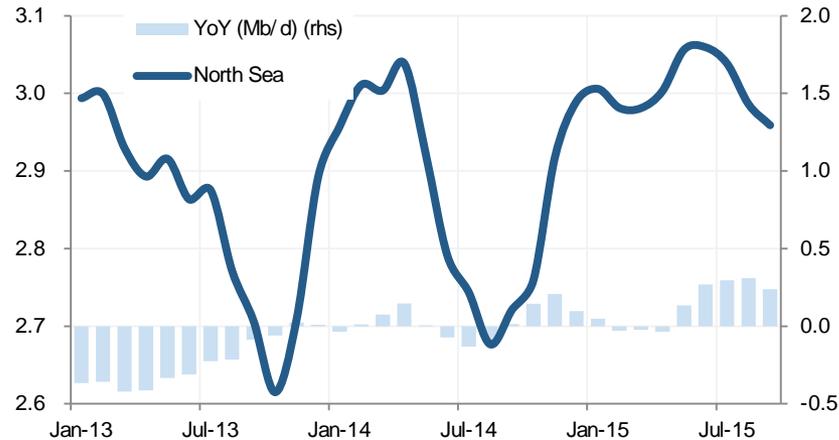
Canada (Mb/d)



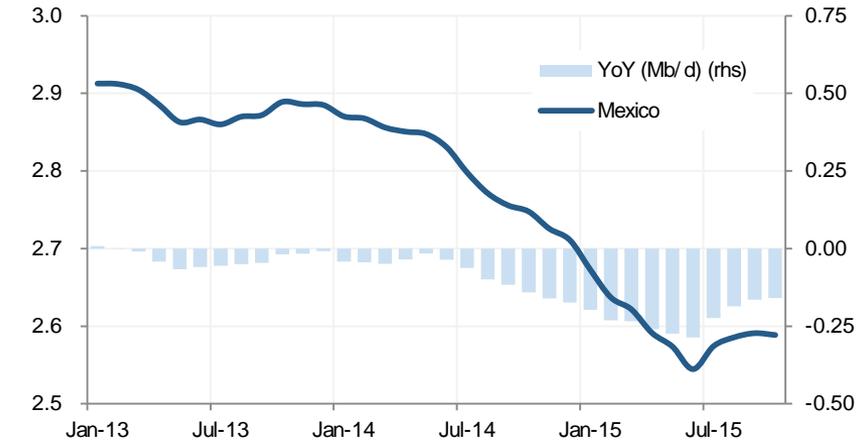
China (Mb/d)



North Sea (Mb/d)



Mexico (Mb/d)

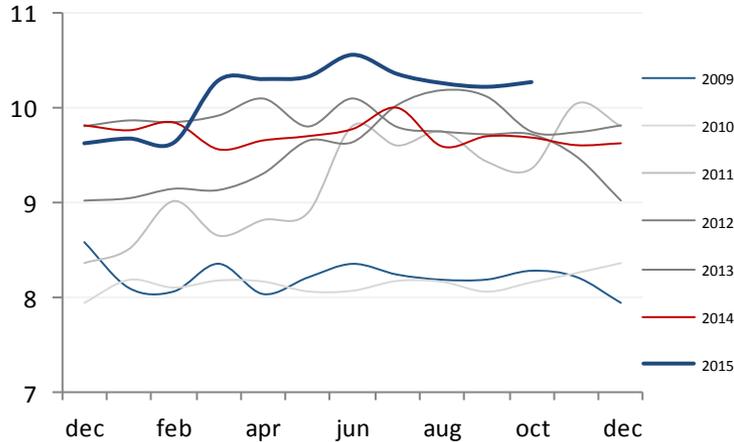


Moving Parts of Oil Supply in and from Saudi Arabia

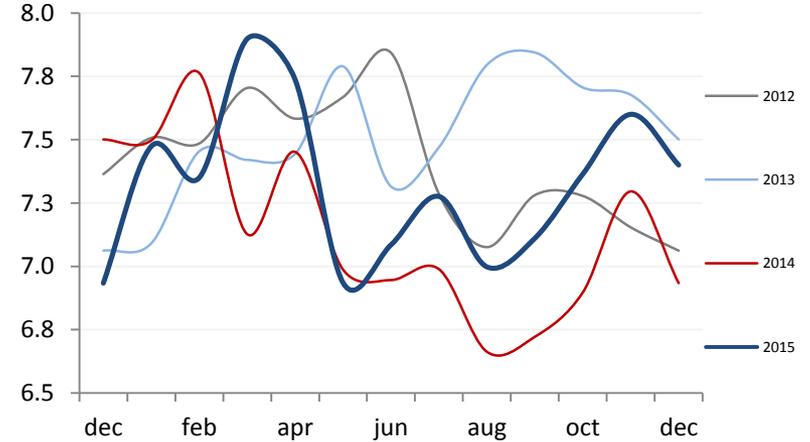
Exports from the kingdom rallied in October and November

For global markets to tighten these exports need to stay down, ideally decline — especially since the kingdom's domestic refining is picking up.

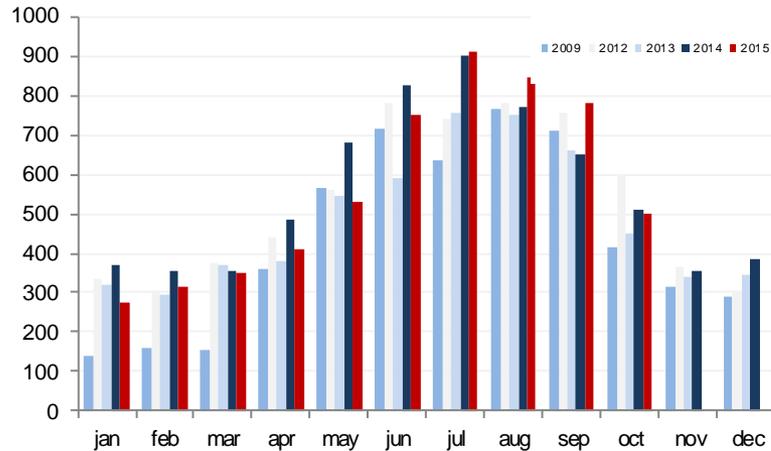
Crude production (MMb/d)



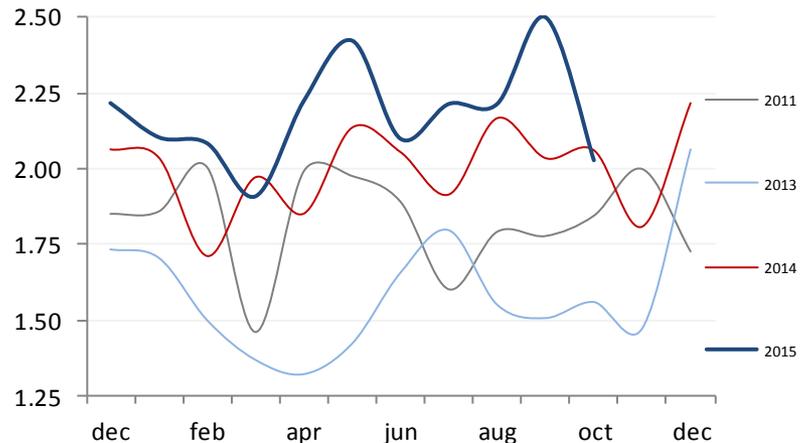
Crude exports (MMb/d)



Crude direct burn (kb/d)



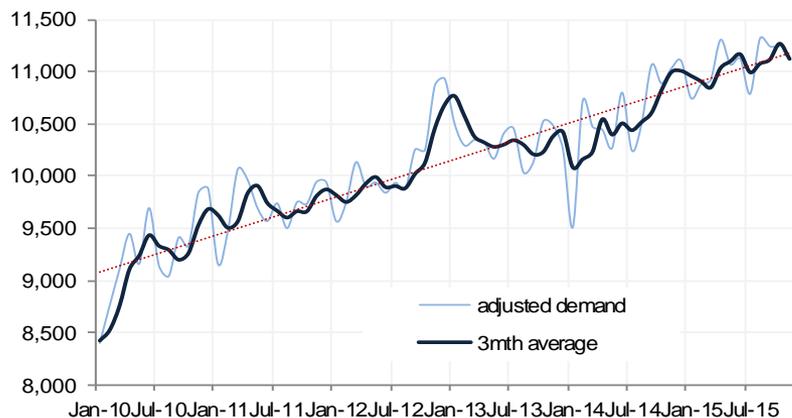
Crude refiner intake (MMb/d)



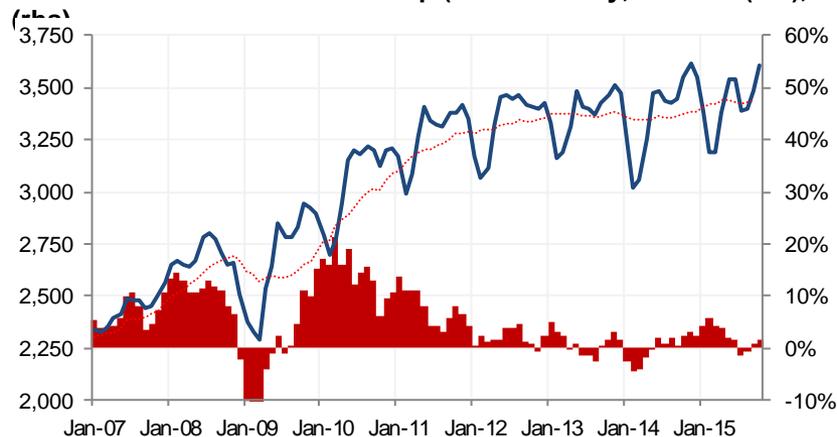
We Still Worry Less Than Most About China's Oil Use

While China's economic growth has slowed, oil demand continues to expand, its composition suggests oil use is shifting from industry-led to consumer-led

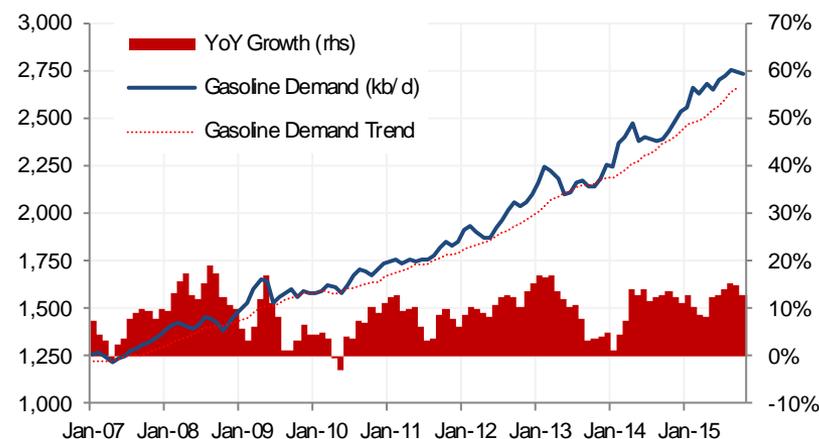
China's oil demand (3mma of monthly data, kb/d)



China's diesel demand inched up (Kb/d monthly, 12 mma (lhs), % yoy (rhs))



Gasoline demand continues to surge (Kb/d, 12 mma (lhs), % yoy (rhs))



China oil demand by product as supplied by the bigger refiners (Kb/d, yoy)

China's oil product demand adjusted for gasoline and diesel inventory shifts							
	2014		2015		YoY change		
kb/d	2014	2014ytd	Nov*	2015 ytd	Nov*	Nov*	2015 ytd
Gasoline	2,183	2,413	2,483	2,692	2,685	8.1%	11.6%
Kerosene	454	496	475	590	549	15.7%	18.8%
Diesel	3,377	3,387	3,617	3,420	3,540	-2.1%	1.0%
MD	3,831	3,883	4,091	4,010	4,090	0.0%	3.3%
Fuel oil	676	621	554	533	489	-11.8%	-14.2%
LPG	793	855	910	992	1,022	12.3%	16.0%
Naphtha	1,064	1,097	1,135	1,154	1,160	2.2%	5.2%
"Drive"	6,014	6,296	6,574	6,702	6,775	3.0%	6.4%
"Burn"	2,533	2,573	2,600	2,679	2,671	2.7%	4.1%
Total	8,547	8,869	9,174	9,380	9,445	3.0%	5.8%

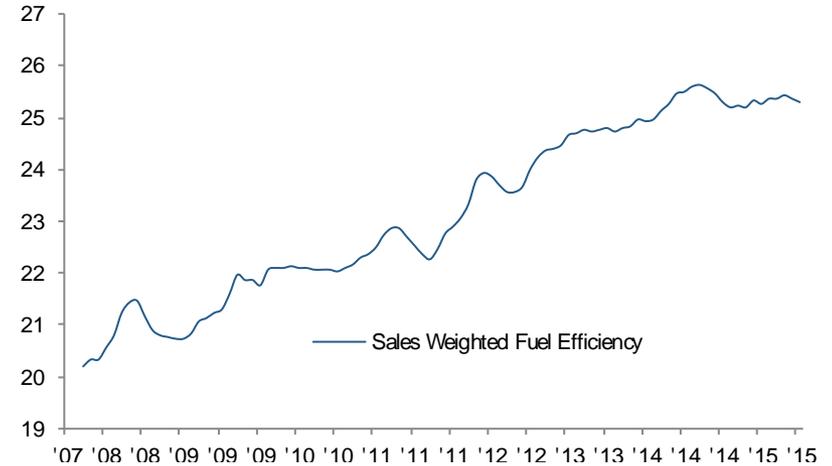
* three month rolling average. "Drive" = gasoline + diesel + kerosene

Oil Demand Growth in the US, More Than Just Low Prices

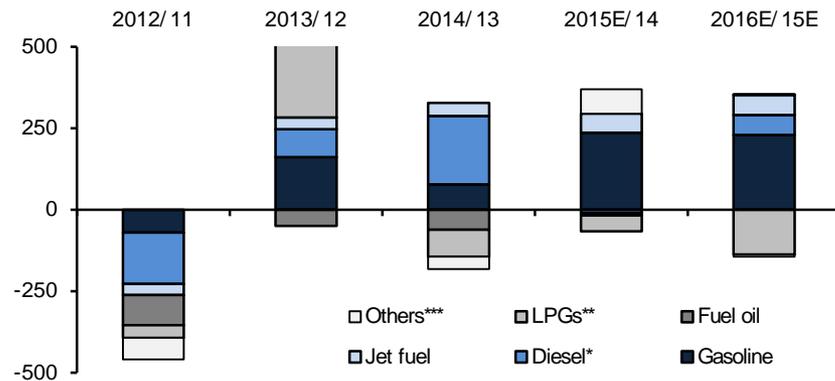
Gasoline tailwinds; and as yet not much 'friction' from efficiencies/substitutes
 In our view US oil demand is the most likely to surprise consensus this year

- The stacked bar chart on the left shows that already in 2014 real growth of transportation fuels accelerated modestly
 - The 'disappointment' relative to our forecast of net 200 kb/d (~1%) of growth last year was driven mostly by contracting LPG burn
- In 2015 our forecast is for about 400 kb/d of total growth, driven by gasoline, jet fuel, and "others". In addition we subtract very slightly in fuel oil and diesel
- The charts to the right clearly suggest that a follow through on the late 2014 mini-trends of rising vehicle miles traveled and deteriorating car fleet efficiency holds upside promise for the ~9 Mb/d US gasoline market ...

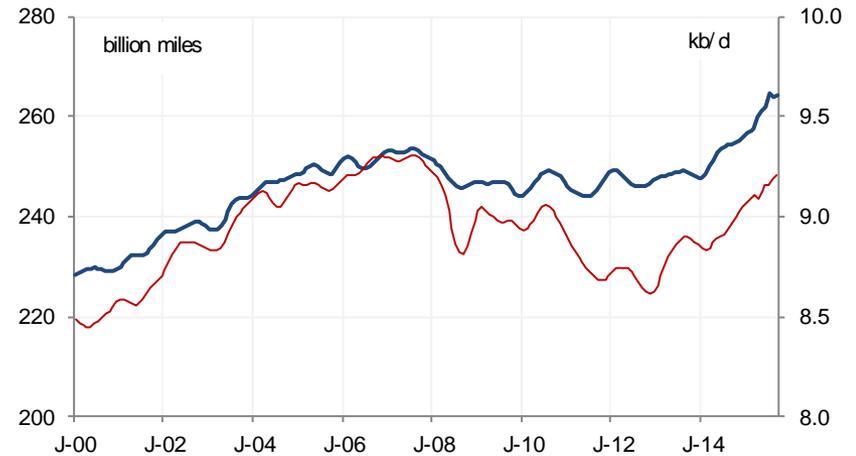
Sales Weighted Fuel Efficiency (mpg)



US oil demand growth by product (annual averages in kb/d, yoy)



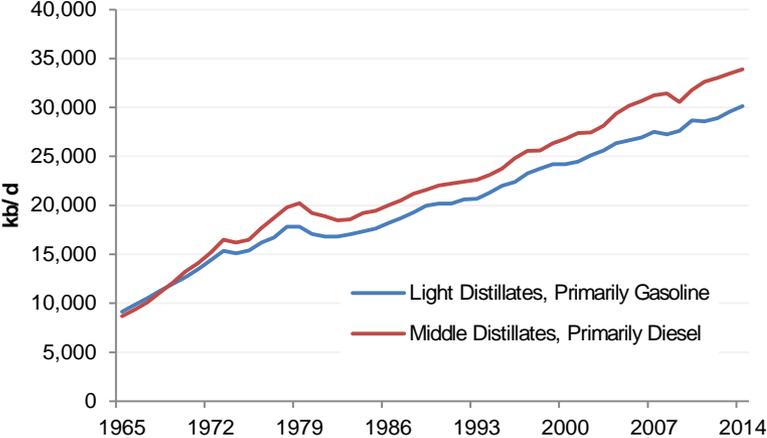
VMT (blue) and Gasoline Demand (red)



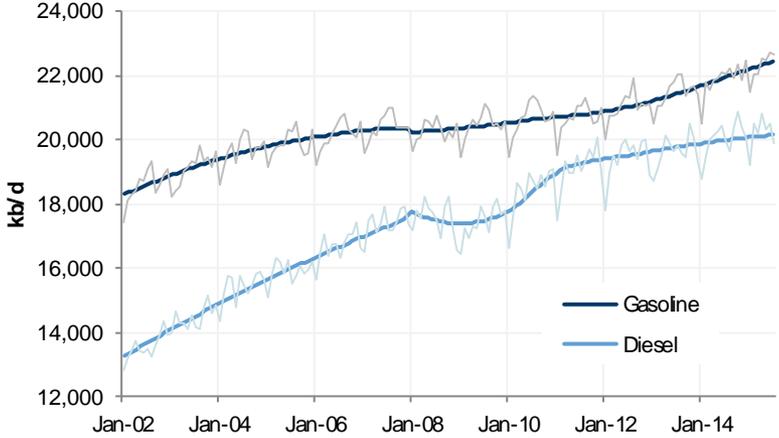
The Ascendance of Gasoline Over Diesel

For an in depth treatment see our recent [Spotlight on Diesel](#)

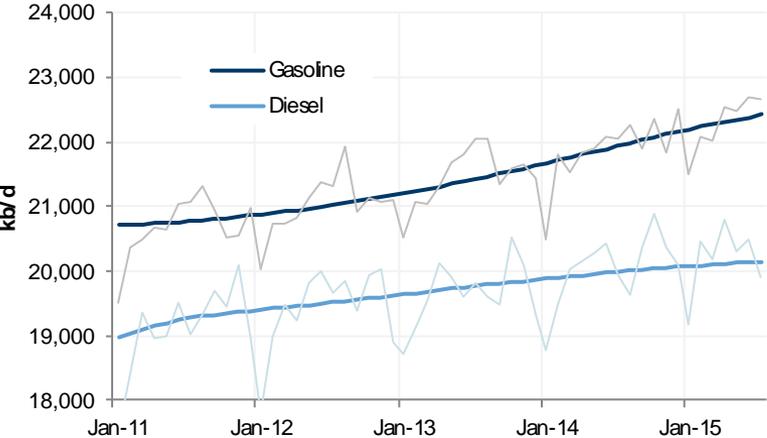
Big history of global gasoline and diesel demand (1965-'14)



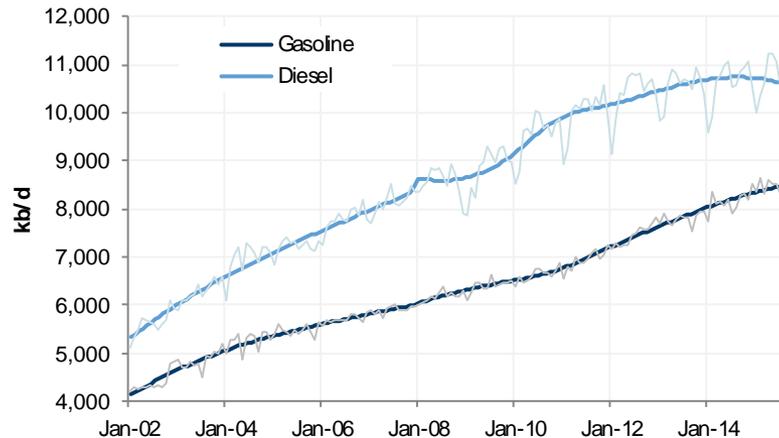
Reported monthly data reveal trends and shifts



Gasoline ascendance since the GFC

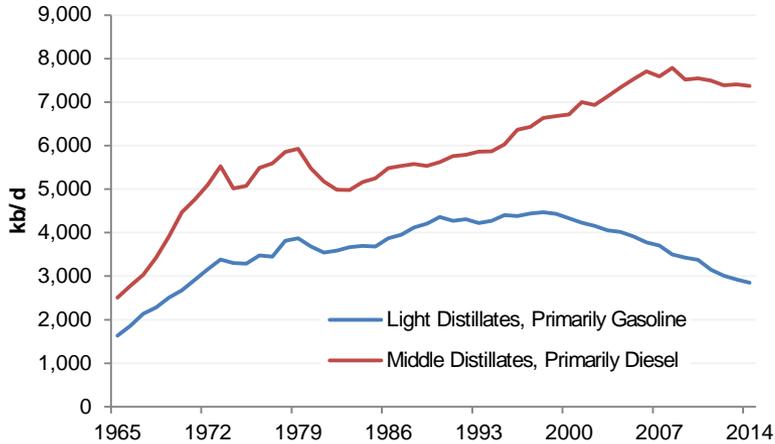


Reported EM demand for gasoline & diesel



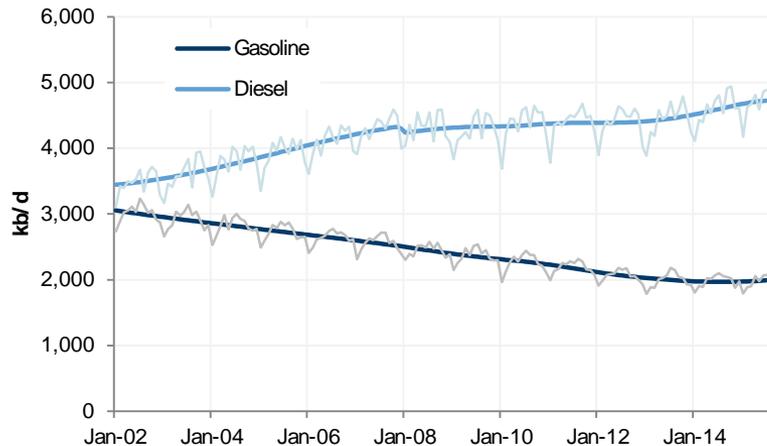
A Different Story in Europe, but Diesel Risks Growing

In Europe diesel became the LDV fuel of choice from the late 1980s on, derailing gasoline use

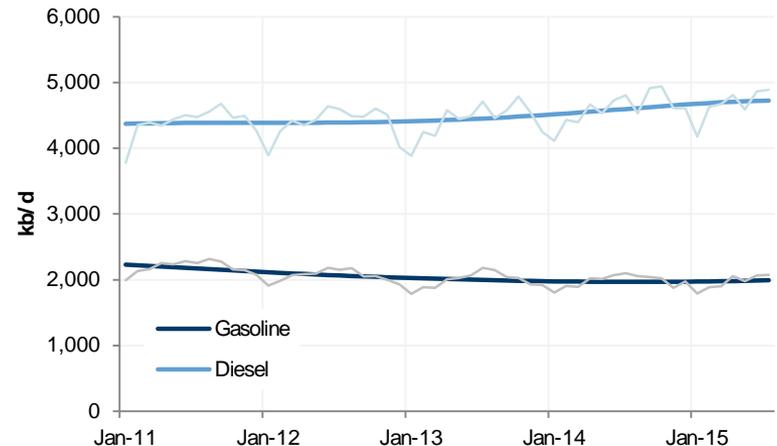


- Government policy post the oil price shocks of the 1970s drove much of the 'dieselization' of Europe that began in earnest in the early 1990s, see Exhibit 9.
- Gasoline cars, while not quite marginalized, comprise less than half the market in the EU, see Exhibit 10.
- In the US, diesel car sales have hovered around 150,000 units per year recently. Their share of the fleet is less than 1% currently. Prospects for a lift-off were only fair to middling, but have grown quite dim: <https://plus.credit-suisse.com/r/41a8w2>.

OECD Europe Demand for Gasoline & Diesel



A fledgling EU recovery benefits diesel more

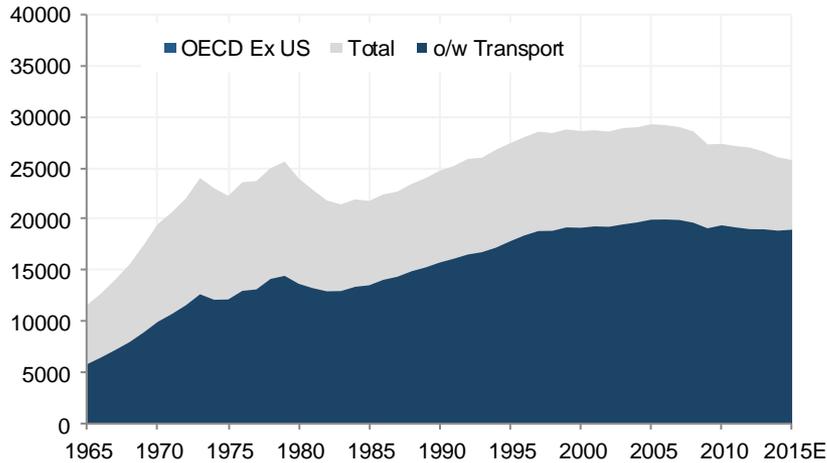


Emerging Market Demand Drives Growth

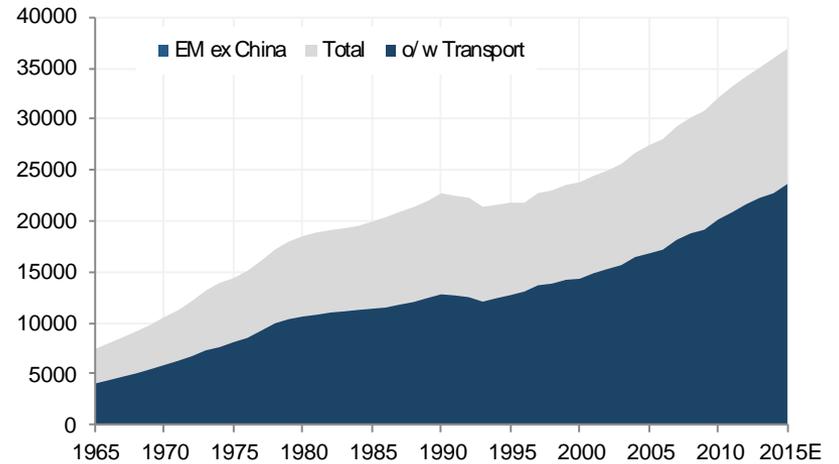
And not just China – EM ex-China has rocketed past OECD ex-US

Globally, growth appears healthy

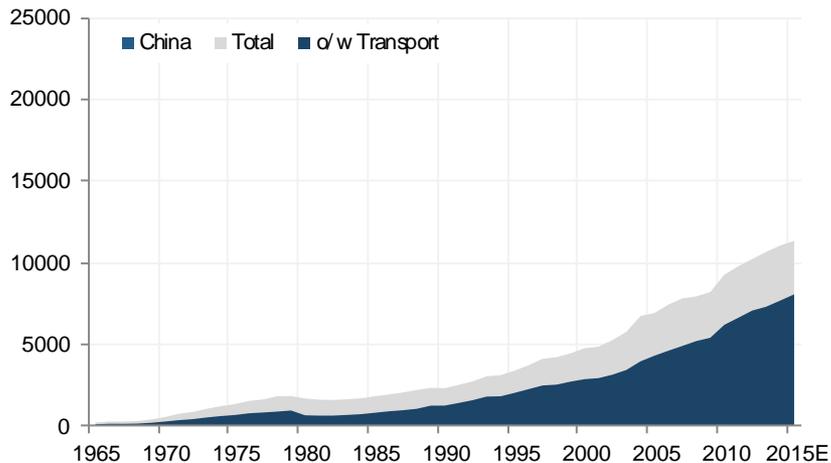
OECD ex-US demand (kb/d)



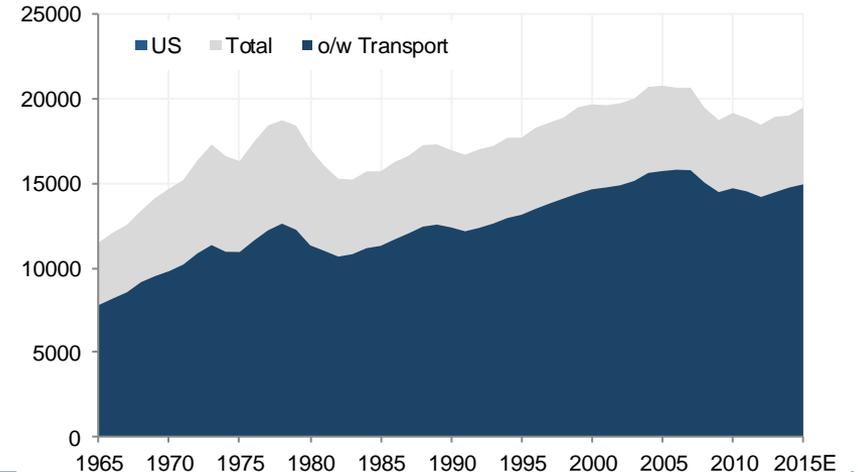
EM ex-China (kb/d)



China (kb/d)



US (kb/d)

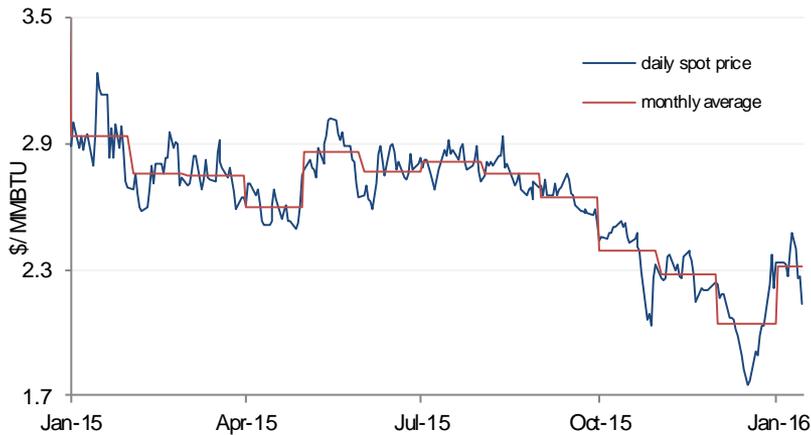


US Gas : Spring Weather in Dec Has Not Been Helpful

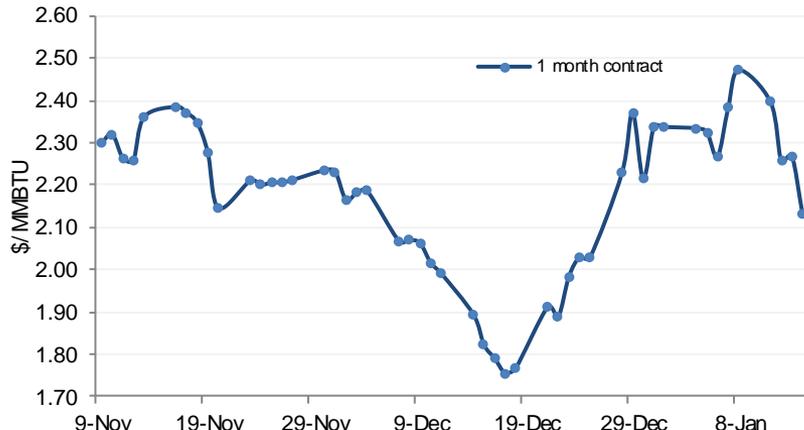
Gas prices have sold off this quarter for a number of reasons, but critical among them are, ongoing resilience of supply, storage constraints and a warm winter

Daily spot futures prices collapsed as the November contract expired, the December contract has scarcely fared better, we will see about January

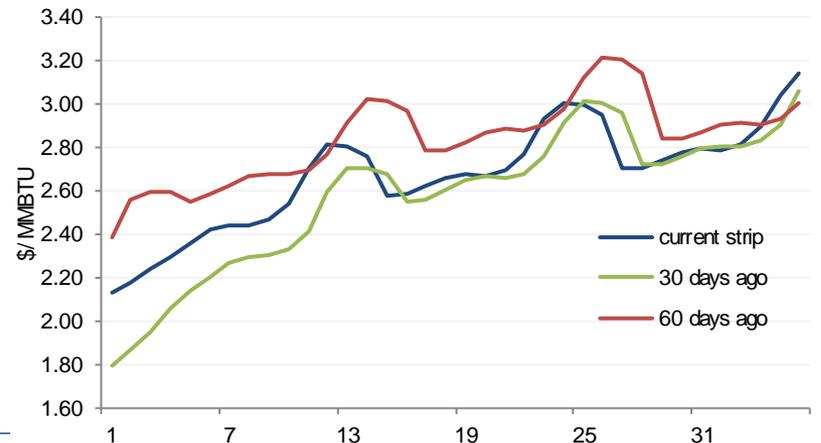
Since early last year, prompt price volatility has correlated directly with volatility of entire calendar spreads one and two and three years out ...



A closer look at recent spot-contract price moves



The entire futures curve has sold off, and the winter premium has been erased



Natural Gas Balances: Supply & Demand Through 2018

(Bcfd)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gross Gas Production (from: ...)										
Shale	10.9	16.0	23.2	28.9	32.9	38.5	44.3	48.1	53.5	60.3
North East Required								23.1	26.2	29.3
YoY growth required								4.0	3.1	3.2
North East	0.5	1.4	3.6	6.7	10.4	14.7	19.1			
Marcellus	0.5	1.4	3.6	6.6	10.1	13.5	16.7			
Utica	0.0	0.0	0.0	0.0	0.3	1.2	2.5			
Barnett	4.9	5.1	5.6	5.7	5.3	4.9	4.4	4.0	3.8	3.7
Fayetteville	1.4	2.1	2.6	2.8	2.8	2.8	2.6	2.4	2.3	2.3
Haynesville	1.9	4.6	7.3	7.3	5.3	4.3	4.0	4.0	4.3	4.8
Mississippian	0.4	0.4	0.4	0.6	0.8	1.0	1.1	1.1	1.1	1.1
Scoop	0.4	0.5	0.5	0.7	0.9	1.3	1.4	1.5	1.8	2.1
Oil and/or NGLs driven										
Bakken	0.1	0.2	0.4	0.7	0.9	1.2	1.5	1.4	1.6	1.9
Eagle Ford	0.0	0.3	1.2	2.6	4.0	5.1	5.9	5.6	6.9	8.6
Niobrara	0.6	0.6	0.7	0.7	0.8	1.1	1.5	1.7	1.9	2.2
Permian	0.7	0.7	0.9	1.2	1.5	2.1	2.8	3.2	3.7	4.4
Coalbed Methane	5.5	5.3	4.9	4.2	3.9	3.7	3.4	3.1	2.9	2.6
Conventional	55.0	52.2	50.0	47.6	44.1	43.7	42.6	41.5	40.2	39.0
ANS	9.1	8.8	8.7	8.7	8.8	8.7	8.6	8.6	8.5	8.5
GOM	6.7	6.2	5.0	4.2	3.6	3.5	3.8	4.0	3.9	3.8
Onshore	39.2	37.3	36.3	34.8	31.6	31.5	30.2	29.0	27.8	26.7
Total Gross Gas Production	71.4	73.5	78.0	80.7	80.9	85.9	90.2	92.8	96.6	101.9
Extraction Loss + Processing Shrink	14.9	15.1	15.3	15.1	14.6	15.4	16.2	16.7	17.3	18.1
Total Dry Gas Production	56.5	58.4	62.7	65.7	66.3	70.5	74.1	76.1	79.3	83.8
Canada (net imports)	7.0	7.0	6.0	5.4	5.1	5.1	5.3	5.1	5.1	5.1
Mexico (net exports)	-0.9	-0.8	-1.4	-1.7	-1.8	-2.0	-2.9	-3.5	-4.4	-4.9
LNG ('-' export / '+' import)	1.1	1.0	0.8	0.4	0.3	0.1	0.1	-0.6	-1.2	-3.4
Total Trade ('-' demand / '+' supply)	7.3	7.1	5.4	4.2	3.6	3.2	2.5	1.0	-0.4	-3.2
Industrial	16.9	18.7	19.2	19.8	20.4	20.9	20.7	21.1	21.8	22.6
Electric Power	18.8	20.2	20.7	24.9	22.4	22.3	26.3	27.9	28.7	29.5
Res/Comm	21.7	21.7	21.7	19.3	22.5	23.6	23.0	21.0	21.1	21.1
Other (Lease Fuel, Pipeline Distribution)	5.4	5.5	5.6	5.9	6.4	6.5	6.8	7.1	7.3	7.5
Total Demand	62.9	66.1	67.1	69.8	71.7	73.3	76.9	77.1	78.9	80.7

Natural Gas Balances: Changes (Yoy) Through 2018

YoY (Bcf/d)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
YoY changes to production from:										
Shale										
North East Required								4.0	3.1	3.2
North East		1.0	2.2	3.1	3.8	4.3	4.5			
Marcellus		1.0	2.2	3.0	3.5	3.3	3.2			
Utica		0.0	0.0	0.0	0.2	0.9	1.3			
Barnett		0.2	0.5	0.1	-0.4	-0.4	-0.5	-0.4	-0.2	-0.1
Fayetteville		0.7	0.5	0.2	0.0	0.0	-0.2	-0.1	-0.1	0.0
Haynesville		2.7	2.7	0.0	-1.9	-1.0	-0.3	0.0	0.3	0.5
Mississippian		0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.0	0.0
Scoop		0.1	0.0	0.2	0.3	0.3	0.1	0.2	0.3	0.3
Oil and/or NGLs driven										
Bakken		0.1	0.1	0.3	0.3	0.3	0.3	-0.1	0.1	0.3
Eagle Ford		0.3	0.9	1.4	1.4	1.2	0.8	-0.2	1.3	1.6
Niobrara		0.0	0.1	0.1	0.1	0.2	0.4	0.2	0.2	0.3
Permian		0.0	0.1	0.3	0.4	0.6	0.7	0.3	0.5	0.7
Coalbed Methane		-0.3	-0.4	-0.7	-0.3	-0.2	-0.3	-0.3	-0.2	-0.2
Conventional		-2.8	-2.2	-2.3	-3.6	-0.4	-1.1	-1.1	-1.3	-1.3
ANS		-0.3	-0.1	0.0	0.2	-0.1	0.0	-0.1	0.0	-0.1
GOM		-0.5	-1.2	-0.8	-0.5	-0.1	0.3	0.2	-0.1	-0.1
Onshore		-1.9	-1.0	-1.5	-3.2	-0.1	-1.3	-1.2	-1.2	-1.1
Total Gross Gas Production		2.1	4.5	2.7	0.2	5.0	4.4	2.6	3.8	5.3
Extraction Loss + Processing Shrink		0.2	0.2	-0.2	-0.5	0.8	0.8	0.5	0.6	0.8
Total Dry Gas Production		1.9	4.3	2.9	0.7	4.2	3.6	2.0	3.2	4.5
Canada (net imports)		-0.1	-1.0	-0.5	-0.3	0.0	0.2	-0.2	0.0	0.0
Mexico (net exports)		0.0	-0.5	-0.3	-0.1	-0.2	-0.9	-0.6	-0.9	-0.5
LNG ('-' export / '+' import)		-0.1	-0.2	-0.4	-0.1	-0.1	-0.1	-0.7	-0.5	-2.3
Total Trade ('-' demand / '+' supply)		-0.2	-1.8	-1.2	-0.6	-0.4	-0.8	-1.5	-1.4	-2.8
Industrial		1.8	0.5	0.6	0.6	0.5	-0.2	0.4	0.7	0.8
Electric Power		1.4	0.5	4.2	-2.5	-0.1	4.0	1.6	0.8	0.8
Res/Comm		0.0	0.0	-2.4	3.3	1.0	-0.5	-2.1	0.1	0.0
Other (Lease Fuel, Pipeline Distribution)		0.0	0.1	0.3	0.5	0.1	0.3	0.2	0.2	0.2
Total Demand		3.2	1.1	2.7	1.9	1.5	3.7	0.2	1.8	1.8

Disclosures



Disclosure Appendix

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