

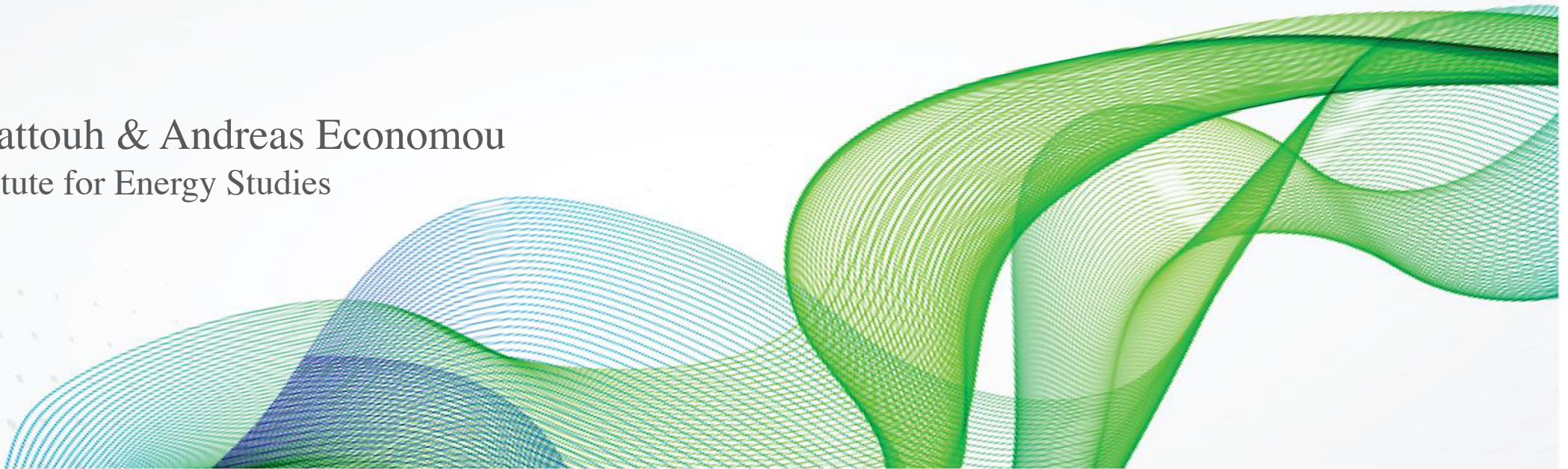


THE OXFORD  
INSTITUTE  
FOR ENERGY  
STUDIES

# Crude Oil Market in 2018 and 2019

## How Did We Get Here? What Next?

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Oxford Institute for Energy Studies

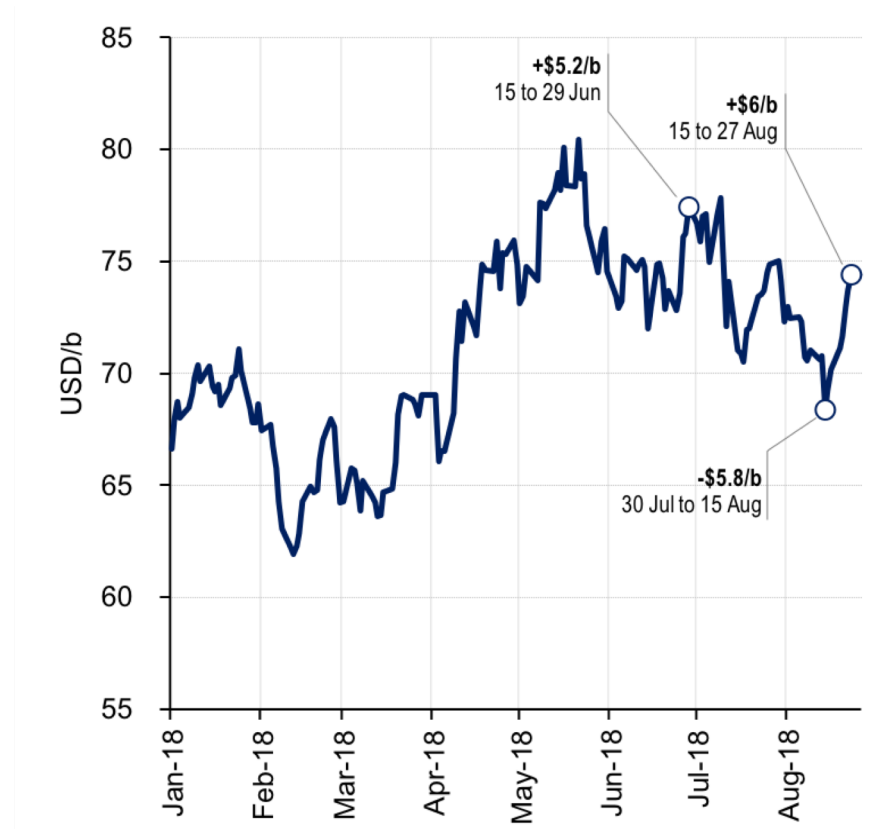


Brazil Energy Future Summit, Rio de Janeiro, 3-4 September 2018



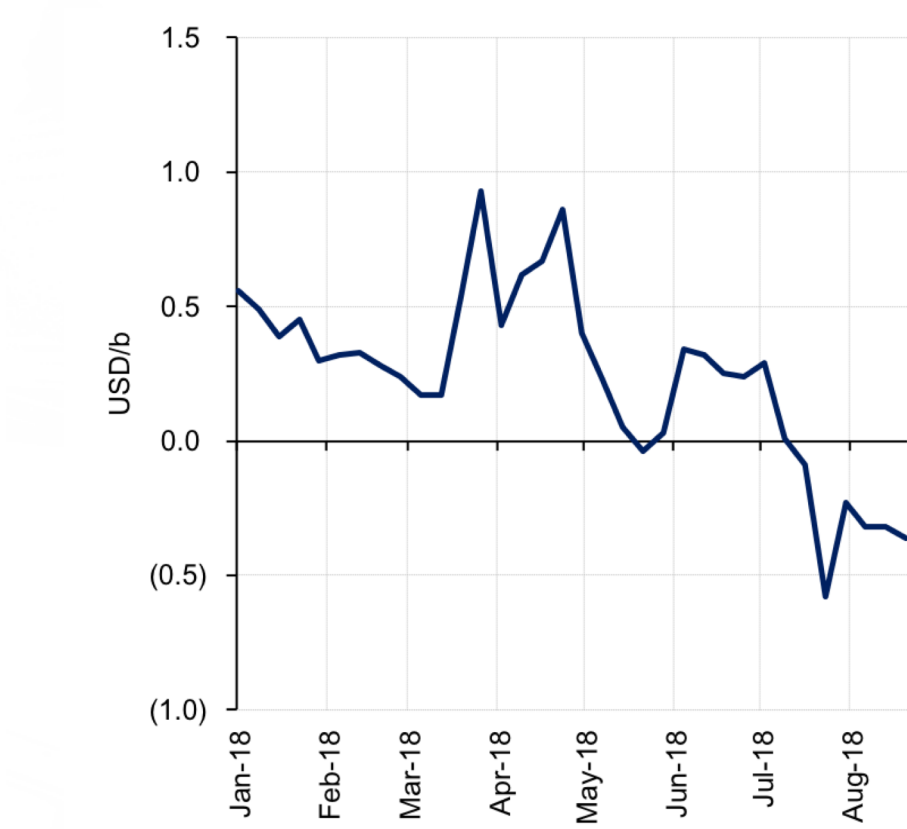
# After sharp recovery upward pressure on oil prices eased

Brent spot price, Jan – Aug 2018

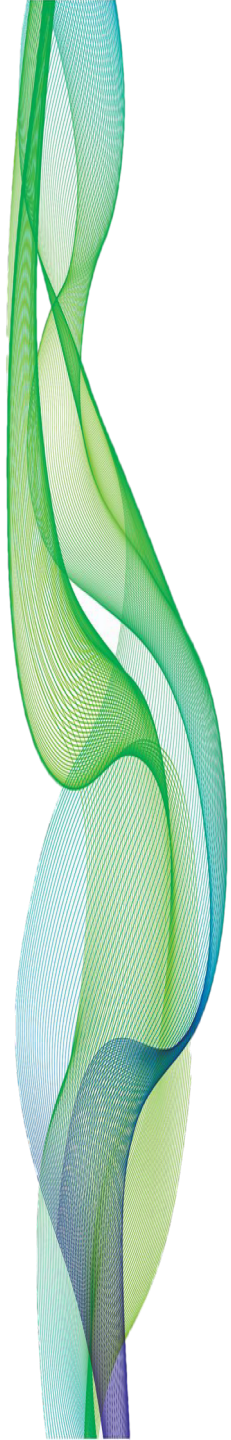


Oil prices rose sharply in April/May reflecting losses from Libya and Venezuela, in conjunction with the realization that the potential losses from Iran could be larger than originally expected (~1.0 mb/d) and mixed OPEC signals.

Brent time spreads 1<sup>st</sup>-2<sup>nd</sup>, Jan – Aug 2018



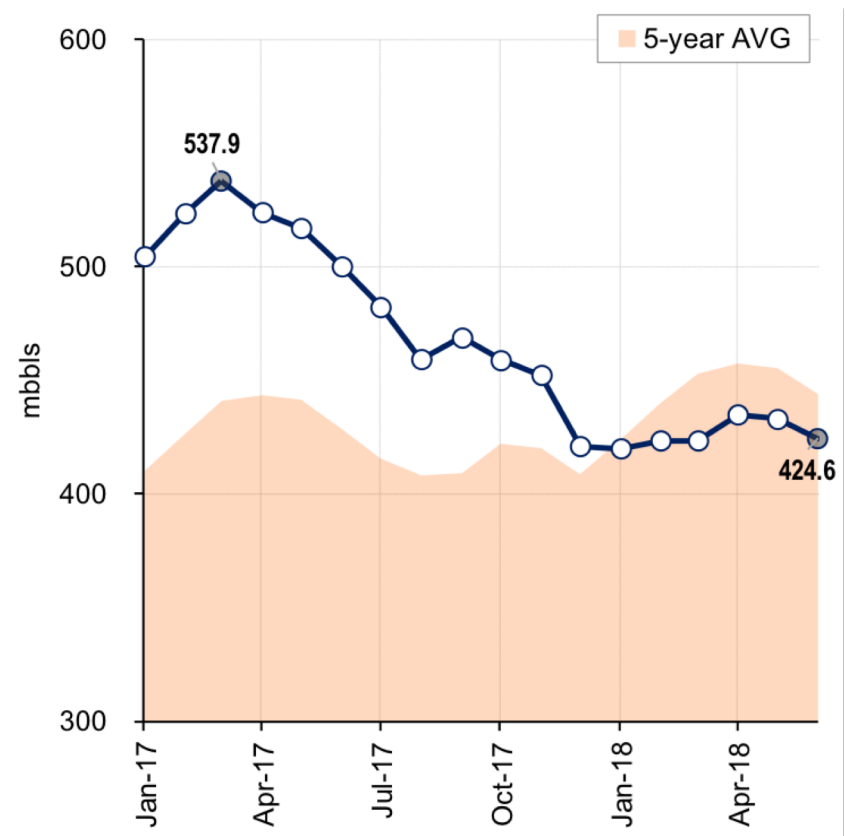
The upward pressure on oil prices eased in June/July with Brent structure flipping into contango as Libyan production recovered, Saudi Arabia ramped-up its output, and the US-China trade spat negatively affected sentiment. In the second-half of August prices rose as market focus shifted towards the supply losses from Iran.





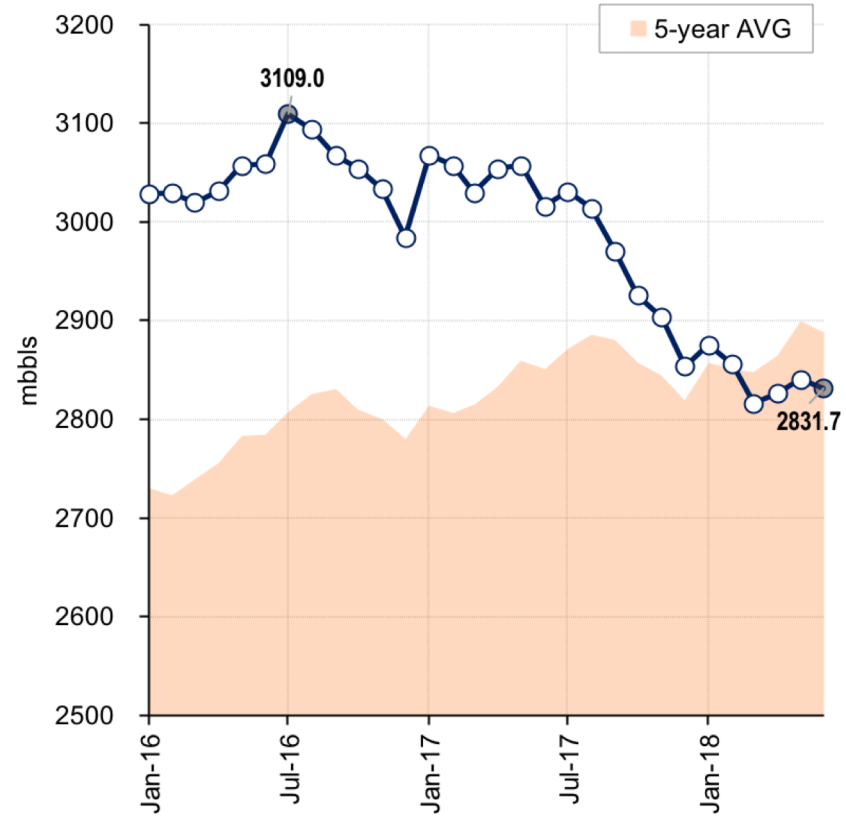
# Price recovery supported by a more balanced market and decline in stocks

US crude oil stocks, Jan 17 – Jun 18

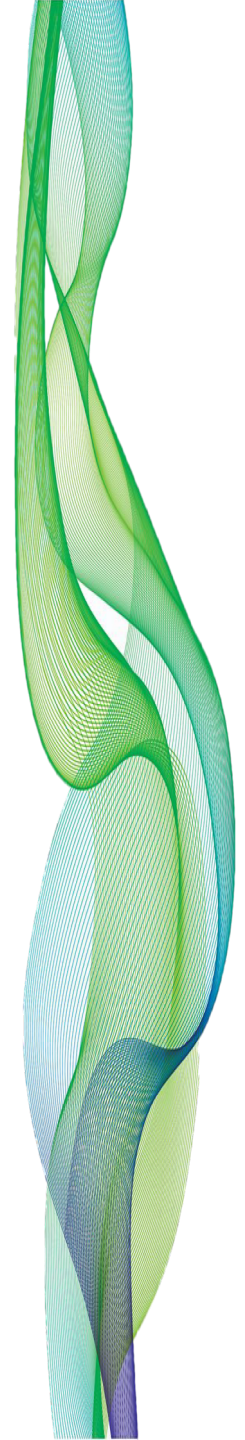


US crude oil stocks have been reduced by 114 mb from their peak in March 2017, down to 424 mb in June 2018, which is 20 mb below their 5-year average.

OECD oil liquids stocks, Jan 16 – Jun 18



OECD total crude and petroleum products stocks have fallen from their highest level of 3109 mb in July 2016 by 277 mb in June 2018, and have fallen below their 5-year average (-56 mb).







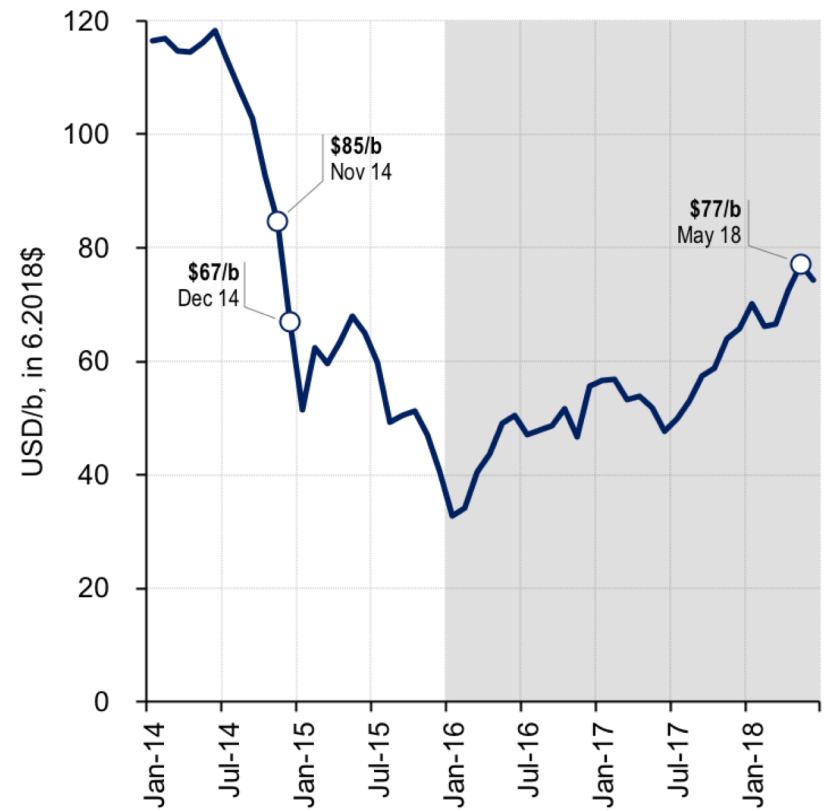
# How did we get to a balanced market?





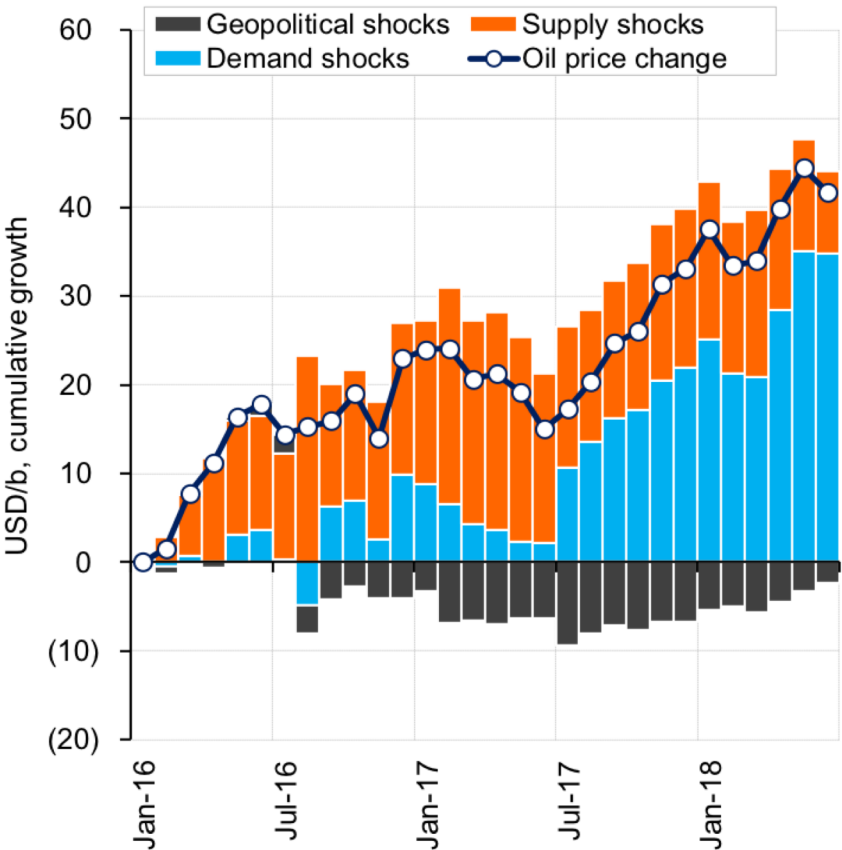
# The oil price recovery in retrospect

Real Brent price, Jan 14 – Jun 18



Between January 2016 and June 2018 the Brent price rose sharply by \$41/b, from \$33/b to \$74/b, exhibiting gains in eight out of ten quarters.

Cumulative contribution of supply-demand, Jan 16 – Jun 18

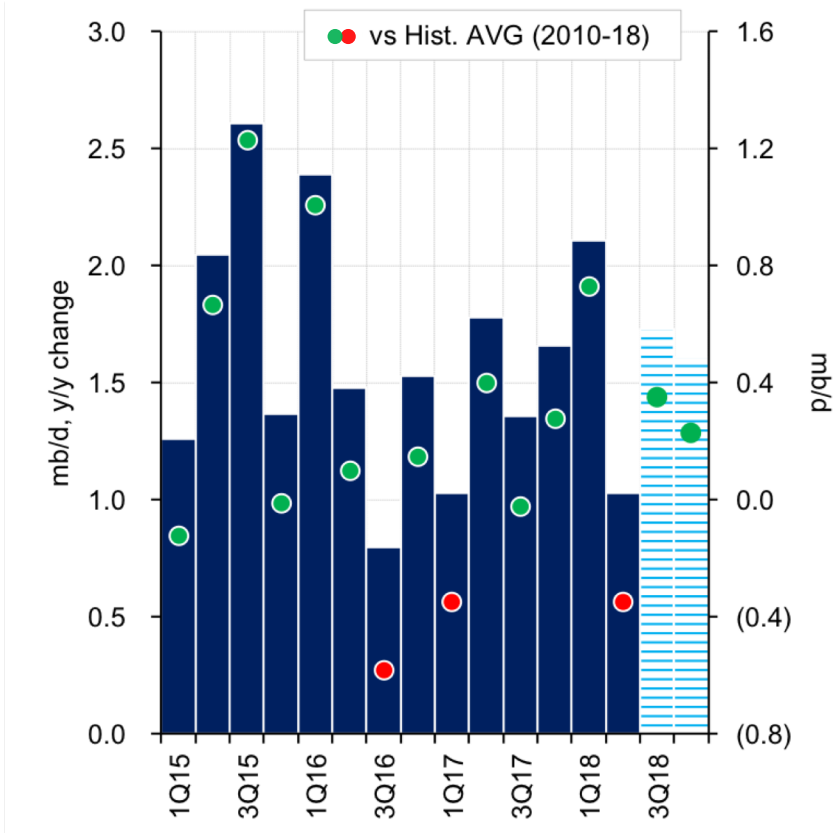


Global oil demand growth accounted for 80% (\$35/b) of the cumulative price increase, followed by oil supply at 20% (\$10/b). The net contribution of geopolitical supply disruptions has been negative (-\$3/b), albeit in 2018 this trend reversed adding \$5/b.



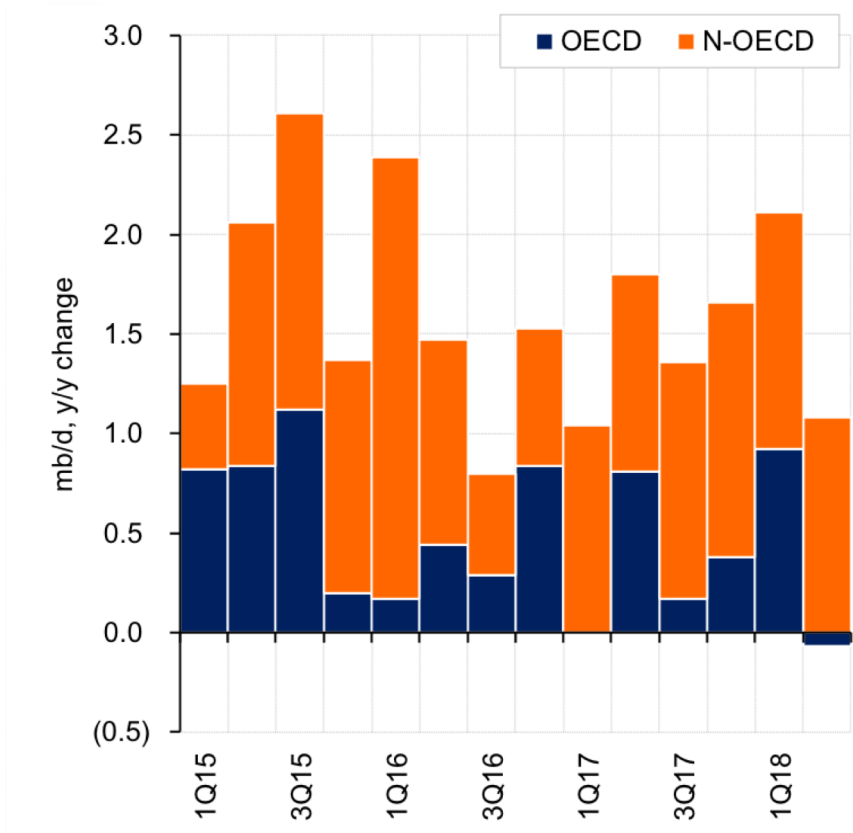
# Oil demand growth main contributor to market rebalancing

Global oil demand, 1Q15 – 4Q18E



Oil demand has been growing strongly above its historical average (2010-18) due to robust economic performance and the supportive low oil price environment, with another year of strong performance expected in 2018.

OECD and non-OECD oil demand, 1Q15 – 2Q18

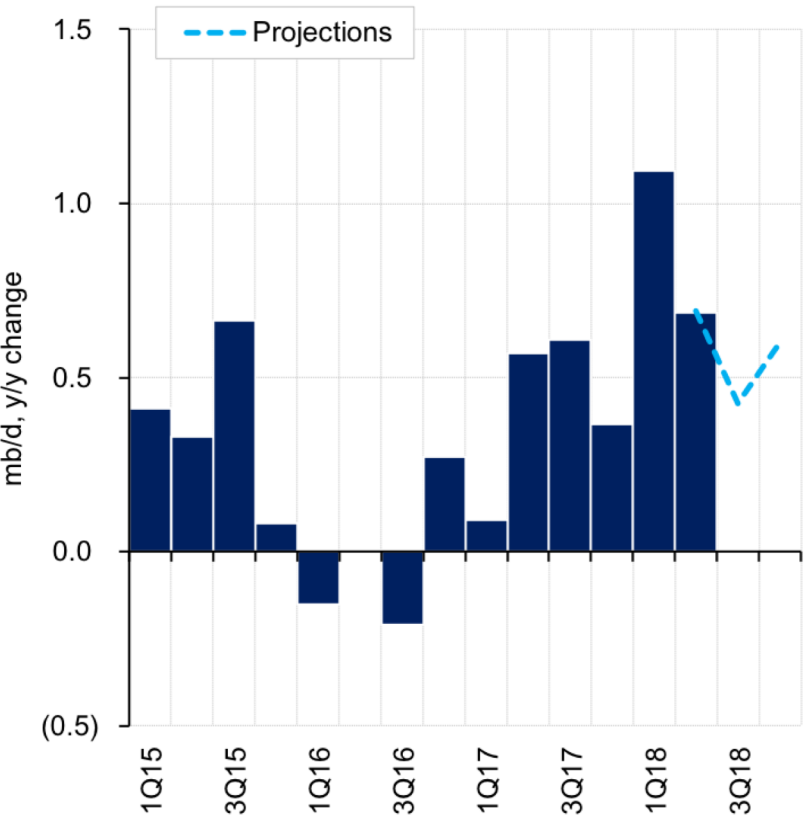


Non-OECD remains the main source of global demand growth, but OECD outperformed expectations as well, having registered positive growth in every quarter between 1Q15 to 1Q18.



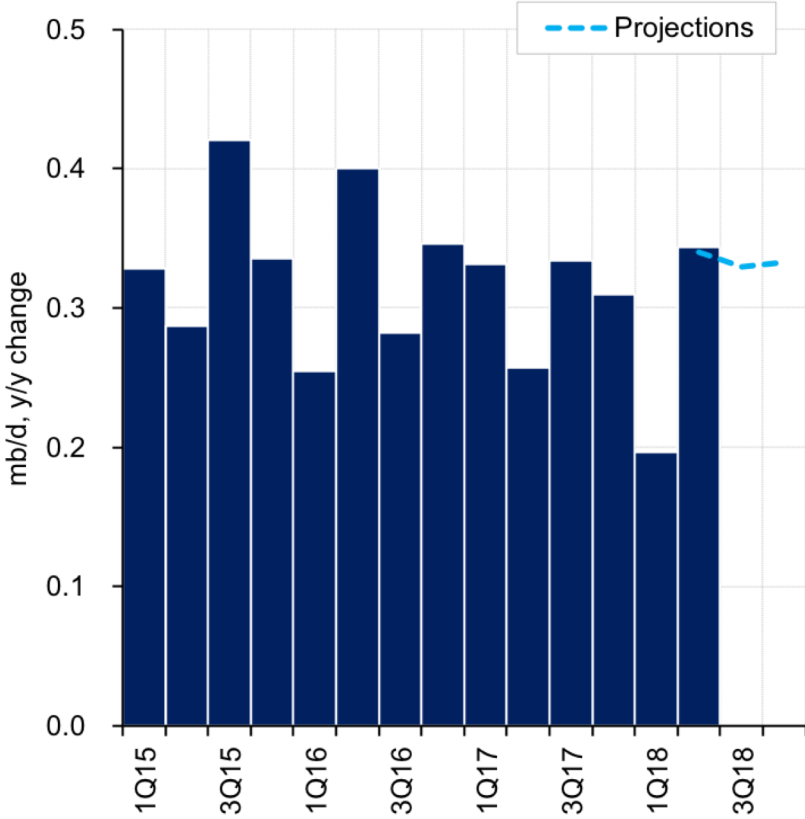
# Middle distillates have been leading the demand growth

Global diesel demand, 1Q15 – 4Q18E

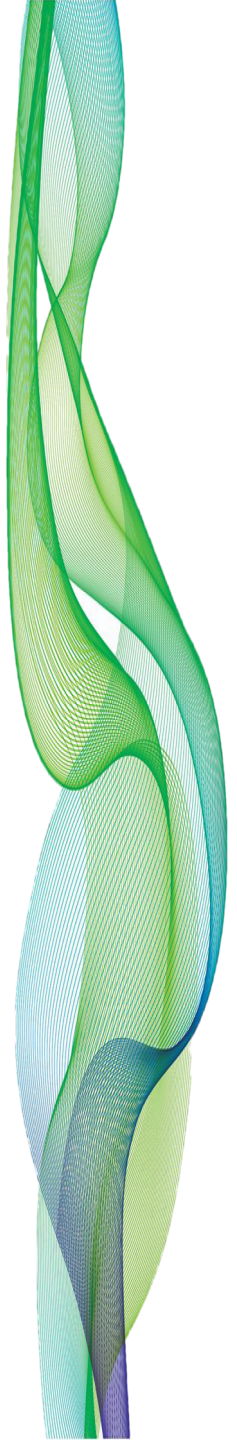


Diesel demand has rebounded since 2017 reflecting the stronger performance of the global economy.

Global jet fuel demand, 1Q15 – 4Q18E



Jet fuel demand has also been growing strongly.

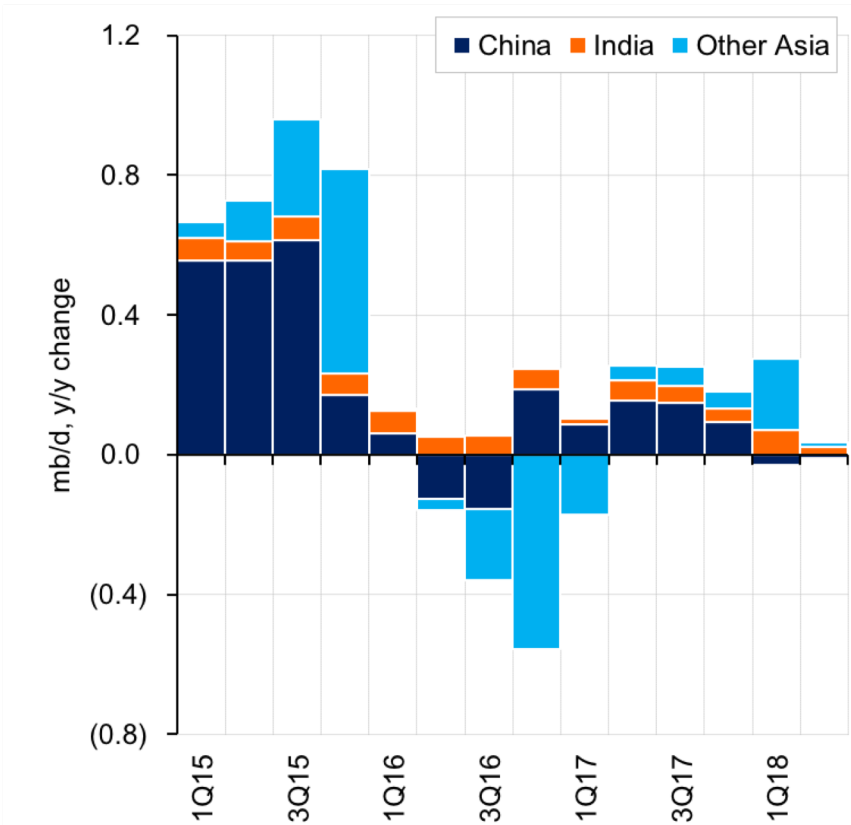






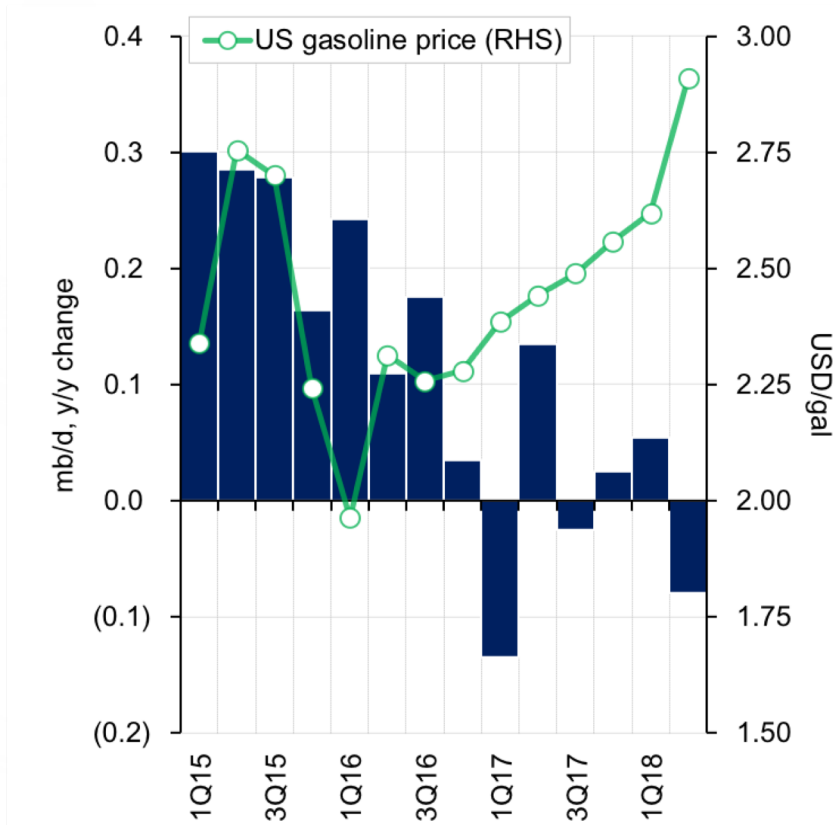
# Gasoline demand growth slowing

Asian gasoline demand, 1Q15 – 2Q18



After strong growth in 2015, gasoline demand in Asia has slowed down markedly, driven mainly by slower gasoline demand growth in China.

US gasoline demand, 1Q15 – 2Q18

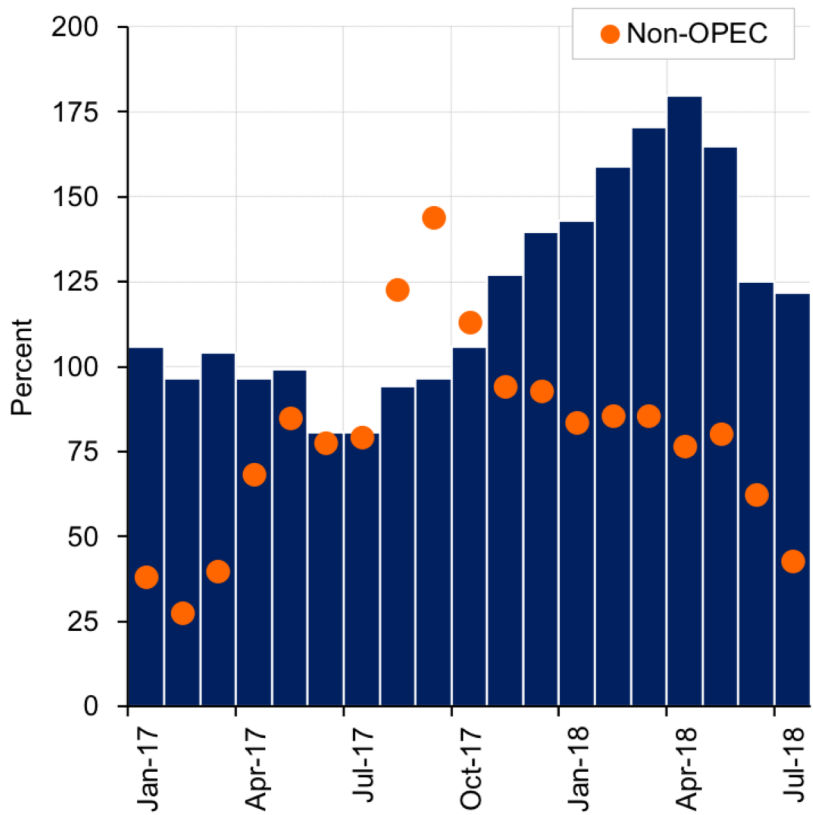


US gasoline demand is also slowing from 2015-16 levels as prices at the pump continue to increase.



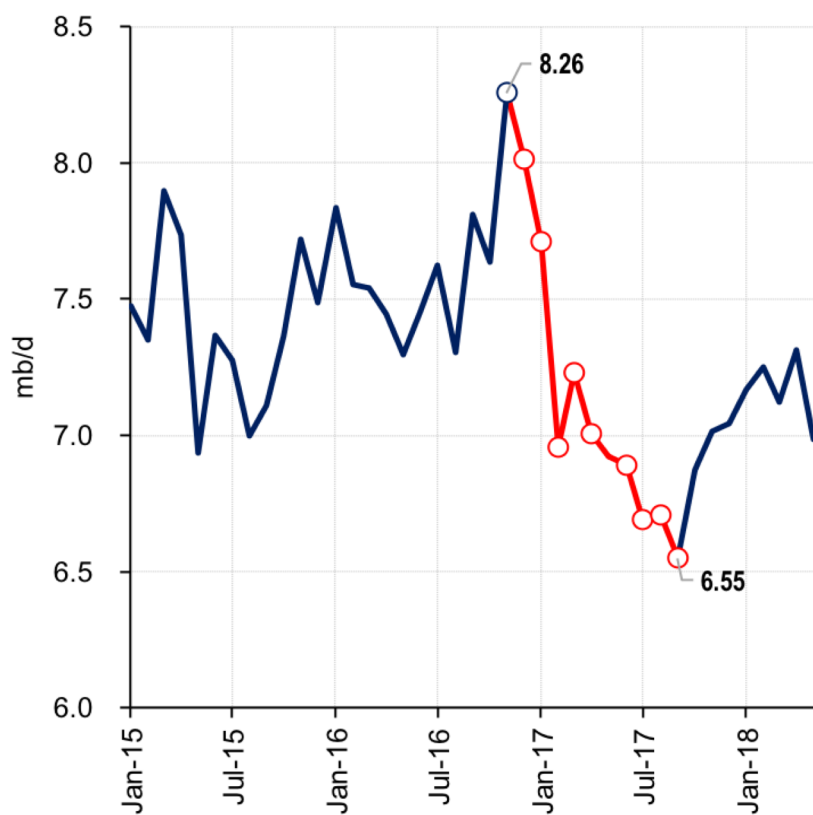
# Higher than expected OPEC compliance another factor

OPEC output compliance, Jan 17 – Jul 18

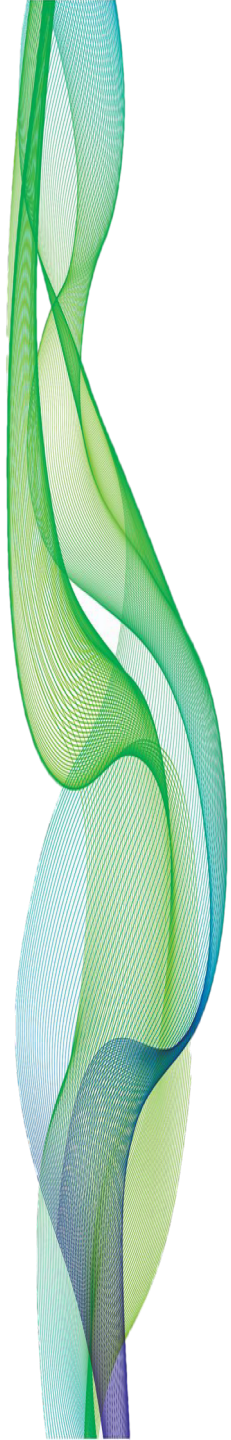


Against all expectations, OPEC compliance has been high exceeding 100%. Following a weak start in the 1H2017, the non-OPEC producers followed suit in the 2H2017.

Saudi Arabia crude exports, Jan 15 – May 18



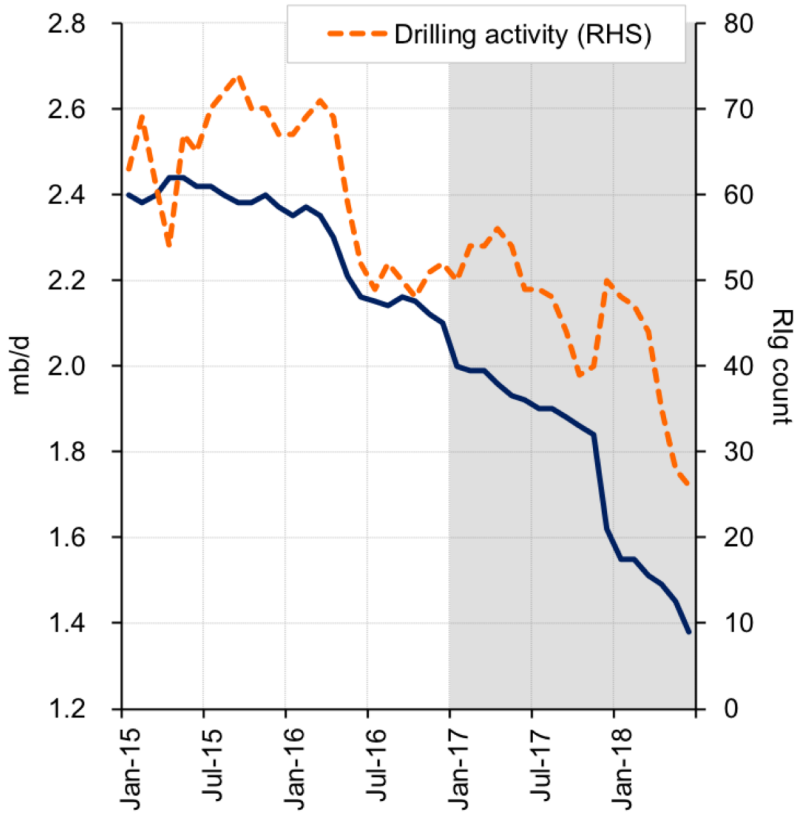
Saudi Arabia led the pack focusing not only on production but also on exports which fell sharply in the 1H2017.





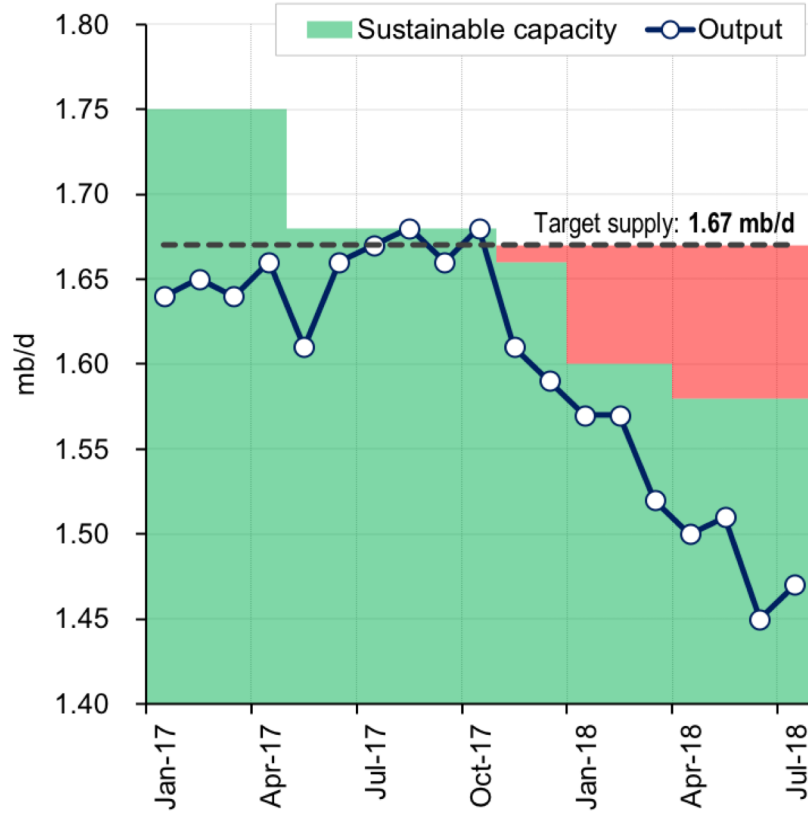
# The high compliance also reflects involuntary cuts

Venezuela oil production, Jan 15 – Jun 18



Venezuela's oil output continues on its downward trend as the country and its oil sector face a prolonged crisis. Production is projected to fall further, as drilling activity is at very low levels due to lack of investment.

Angola supply profile, Jan 17 – Jul 18



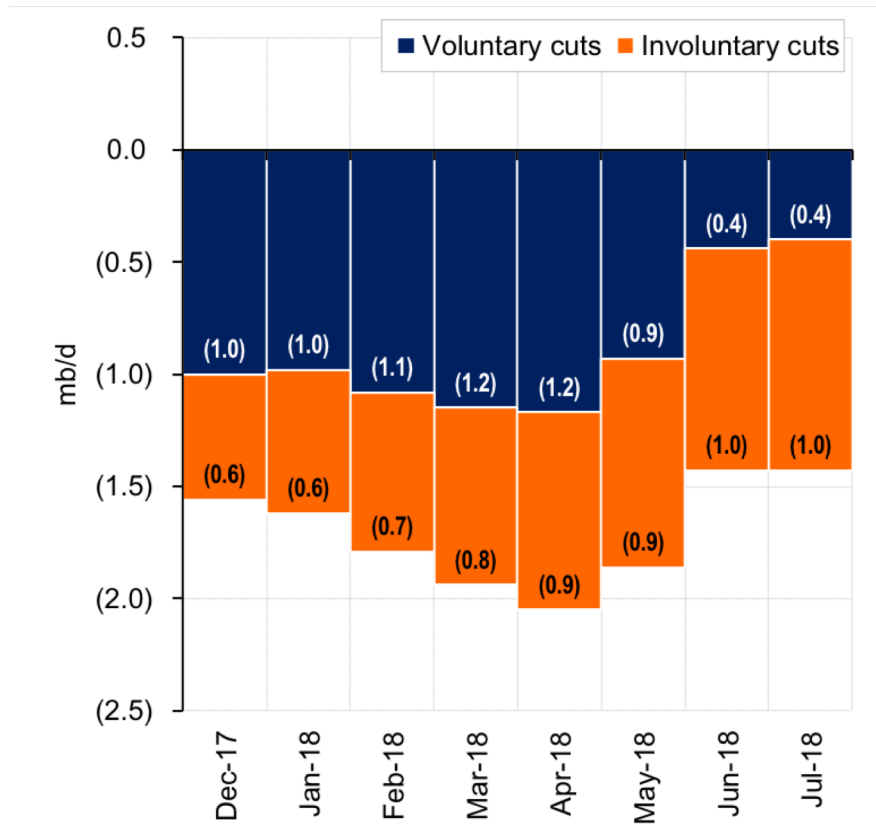
Angola is another case in point exhibiting sharp declines in oil production as a direct result of underinvestment in upstream oil. The expected start of new oil fields is unlikely to reverse the declining trend.





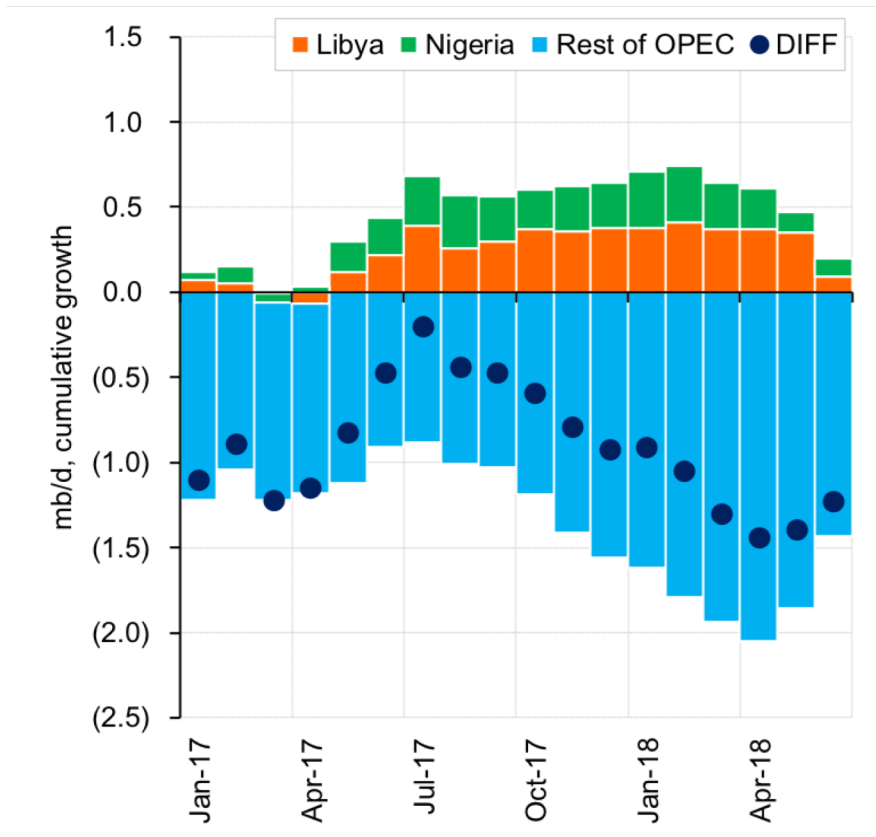
# Involuntary cuts deepened in the first half of 2018

OPEC output cuts, Dec 17 – Jul 18



By May 2018, the involuntary cuts equaled and thereafter exceeded the pledged target cuts, forcing OPEC to reassess the future of its oil output policy.

Libya and Nigeria output growth, Jan 17 – Jun 18

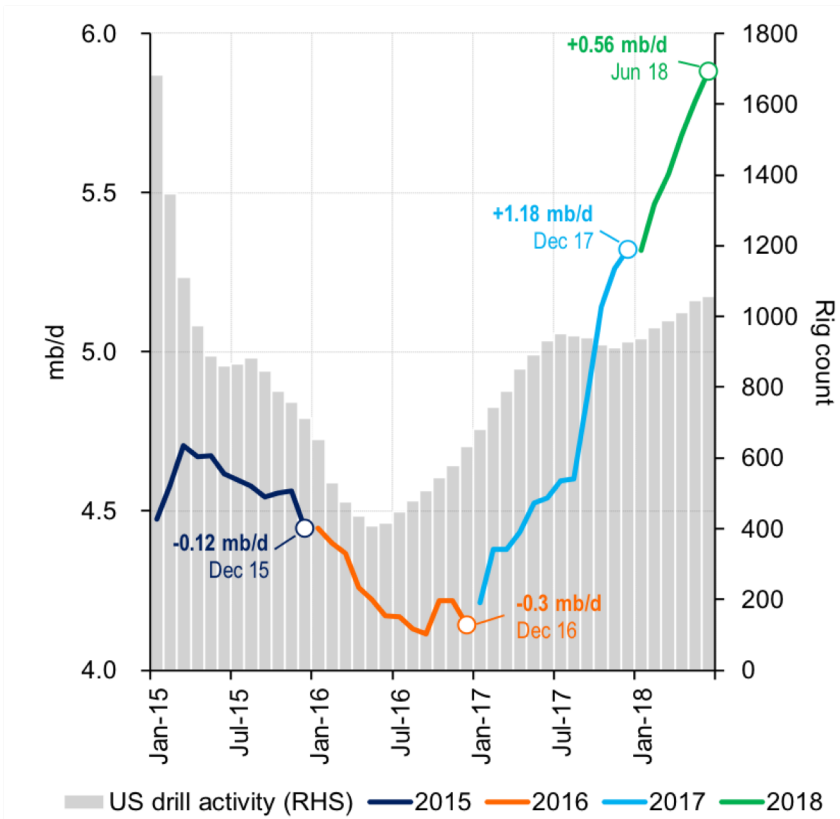


While output from Libya and Nigeria recovered by more than 0.5 mb/d, these gains were not able to offset the impact of the OPEC cuts, nor to cushion involuntary cuts.



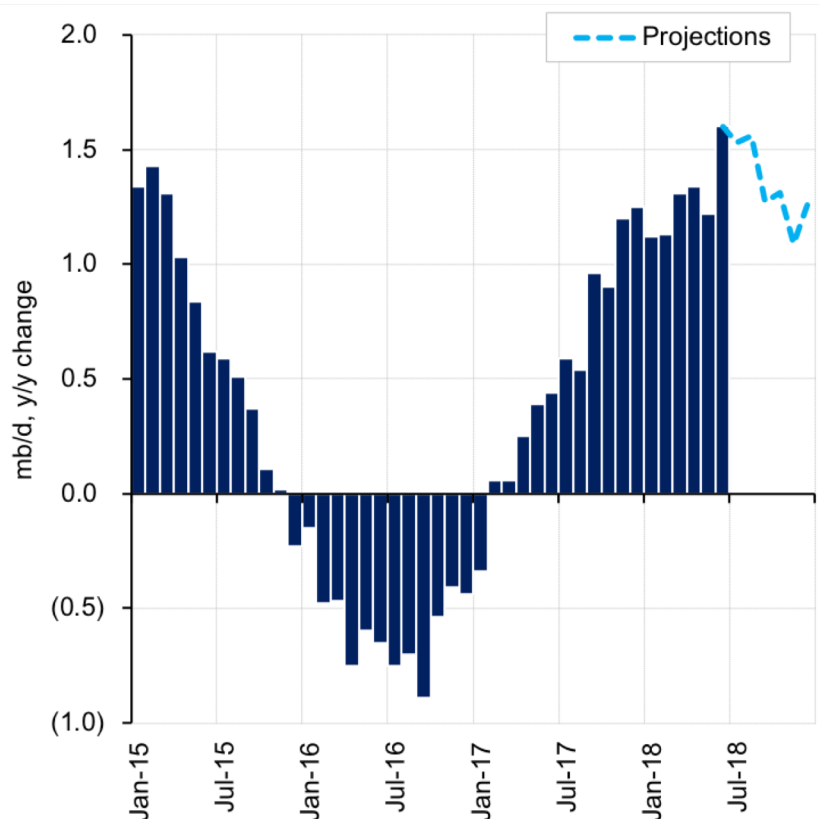
# The market rebalanced despite strong US shale growth

US shale production, Jan 15 – Jun 18



Oil rig count in the US rose sharply as OPEC started sending signals that it will cut output and oil prices started to recover as a response.

US crude output, Jan 15 – Dec 18E



US crude output y/y declines peaked in September 2016 reverting back to growth in April 2017, ending-2017 1.25 mb/d higher relative to the year before; and is now expected to reach 1.27 mb/d ending-2018.



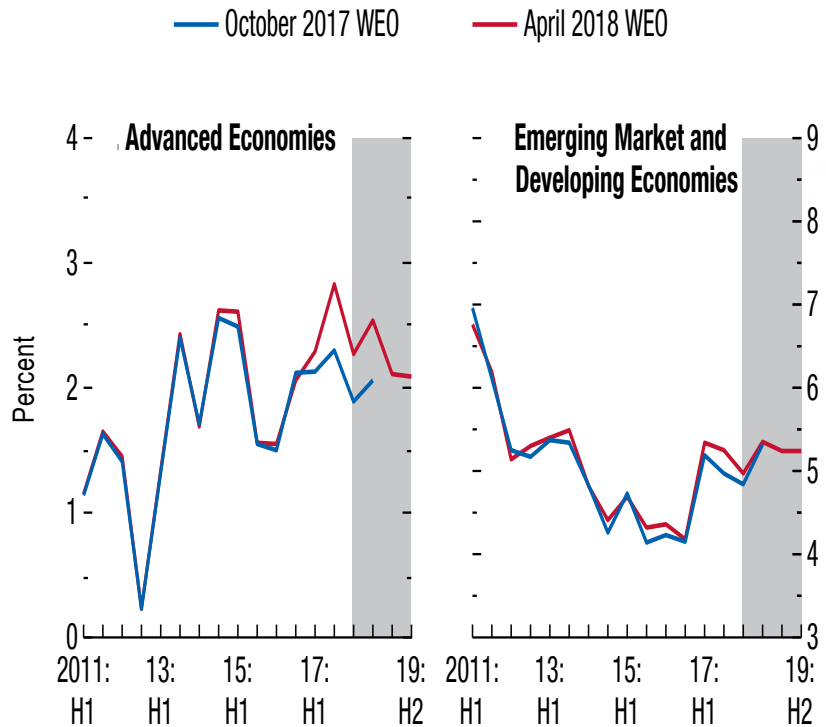
# What is next for the oil market?





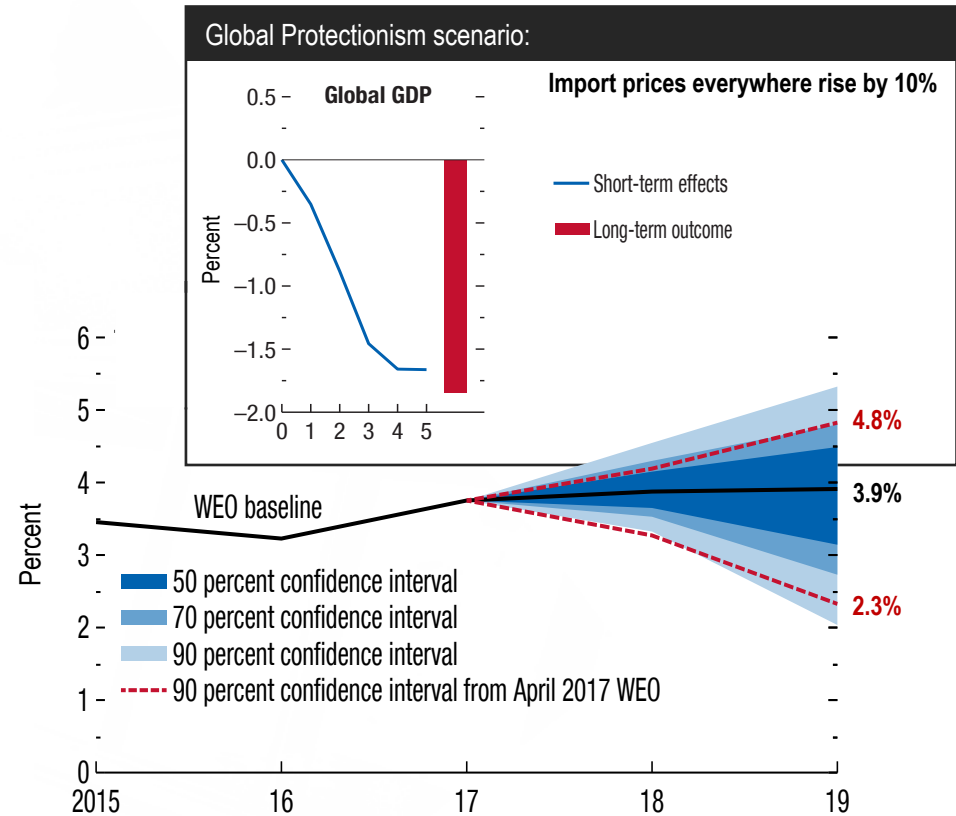
# Robust economic performance though risks are mounting

Global GDP growth, 1H11 – 2H19E



Global growth in 2017 was the strongest since 2011 at 3.8%, where it is expected to remain in 2018 rising to 3.9% in 2019.  $\frac{2}{3}$  of countries accounting for  $\frac{3}{4}$  of global output experienced faster growth in 2017 than in the previous years.

Risks to the global outlook, 2015 – 2019E

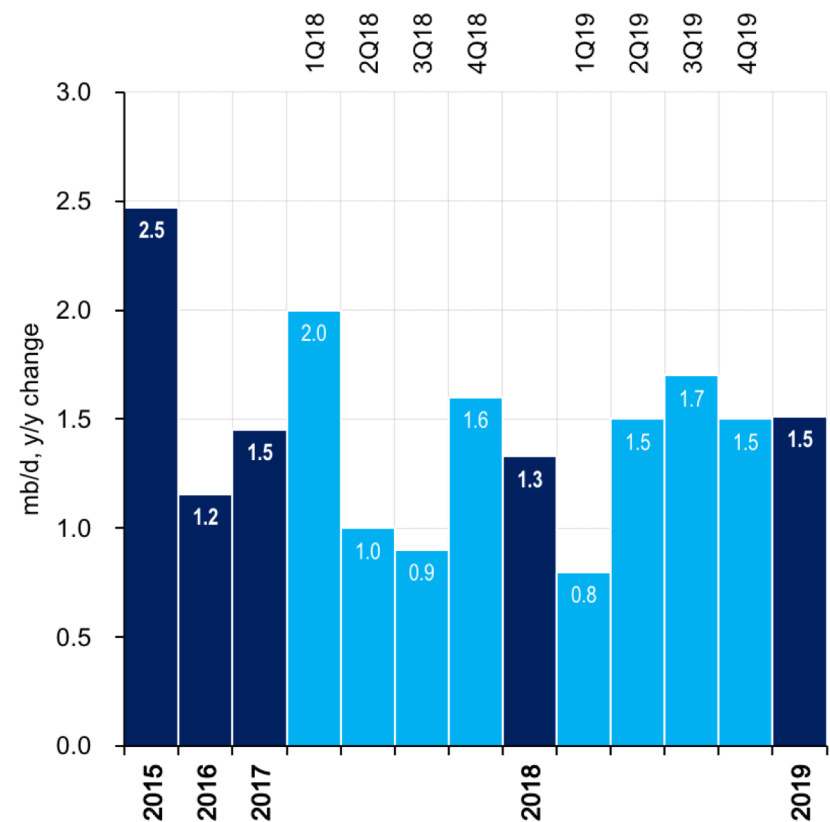


The risks to the global outlook are broadly even in the short-run but in the long-run they are skewed to the downside. Risks of an escalation and generalization of the trade tariffs could trim about 2% from global growth.



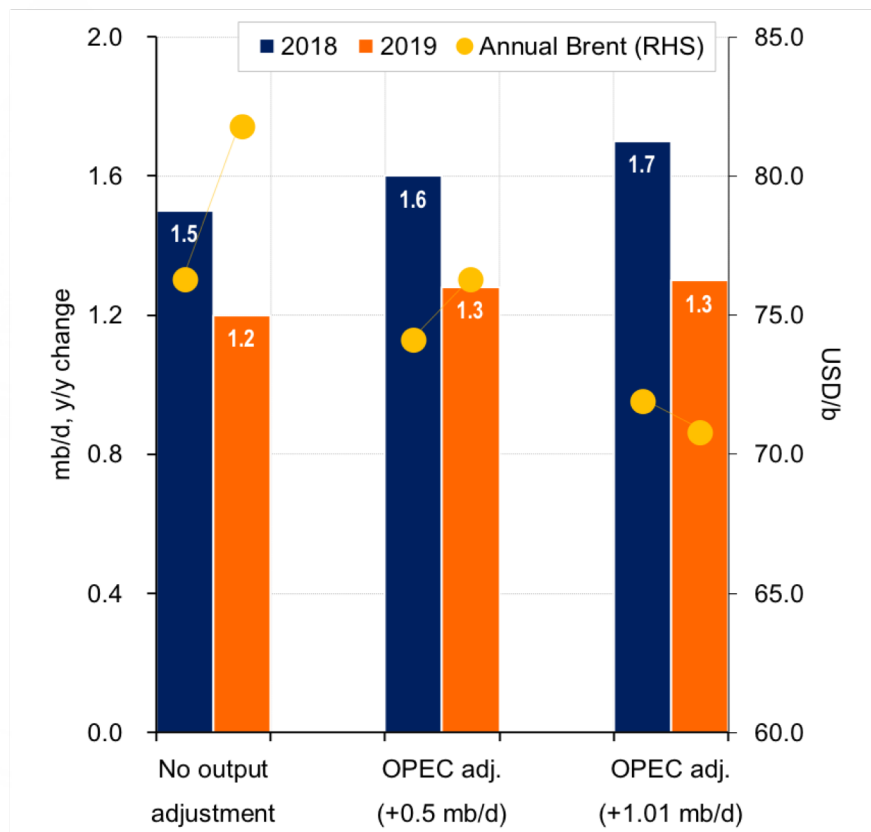
# Prospects of oil demand growth

Annual oil demand growth, 2014 – 2019E



IEA expects 2018 to register another strong performance for global oil demand but growth is expected to ease as risks to the global economy mount and oil prices rise.

Expected price impact on demand growth

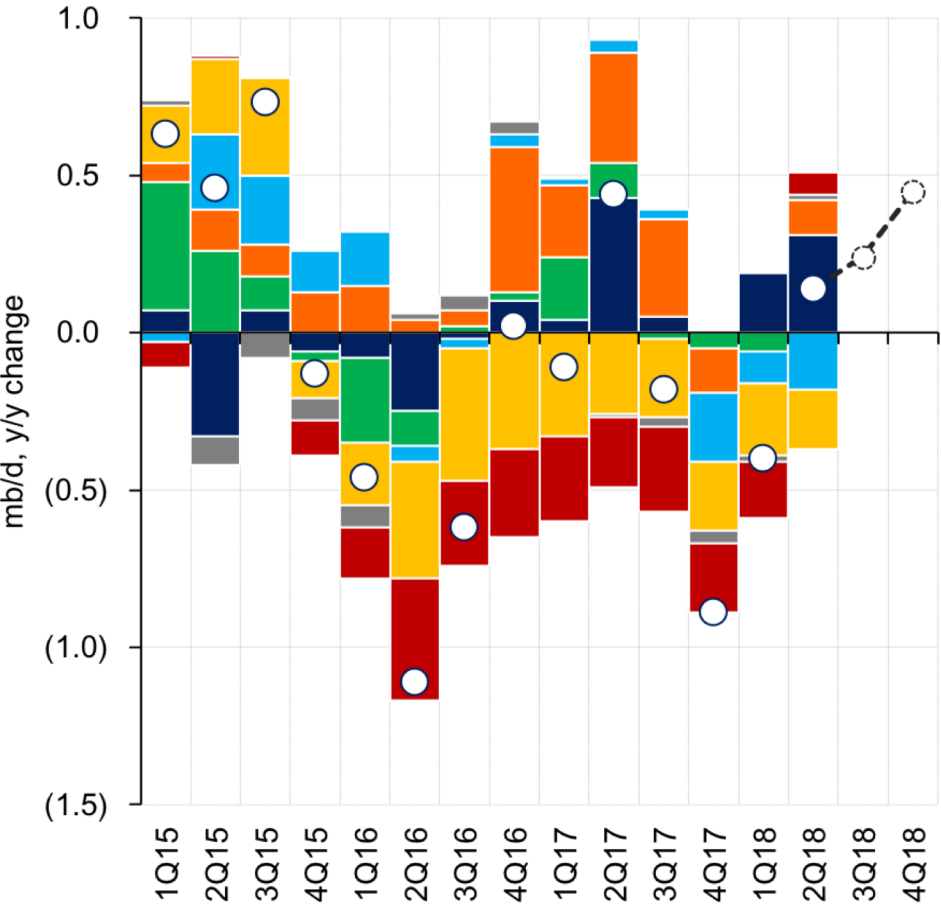


The impact on demand growth from higher oil prices is expected to be felt in 2019, when even under the most bearish assumptions about the oil price, y/y growth is expected to fall by at least 0.3 percentage points.



# Growth in non-OPEC supply outside the US anemic

Non-OPEC supply excl. US, 1Q15 – 4Q18E



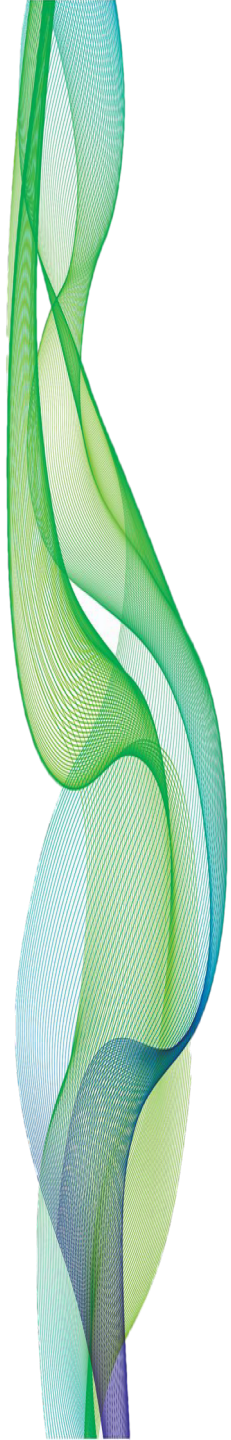
## Non-OPEC supply growth has been limited

After robust growth in the environment of high oil prices, the year-over-year change in non-OPEC supply outside the US has turned negative in almost every part of the world.

With Russia capping its production under the OPEC+ Declaration of Cooperation, non-OPEC supply growth has been limited to a few oil-producing countries.

For many, crude oil production has fallen sharply due to the natural decline rates in maturing oilfields in conjunction with underinvestment in new production.

Canada and Brazil will lead the non-OPEC supply growth outside the US, with the FSU producers following suit.

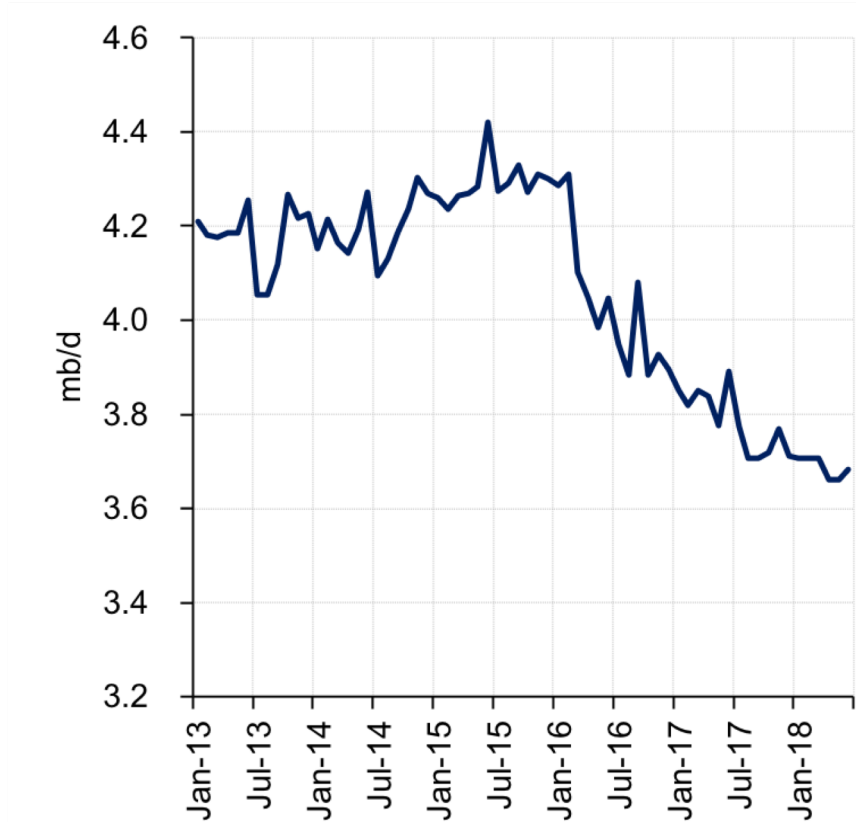






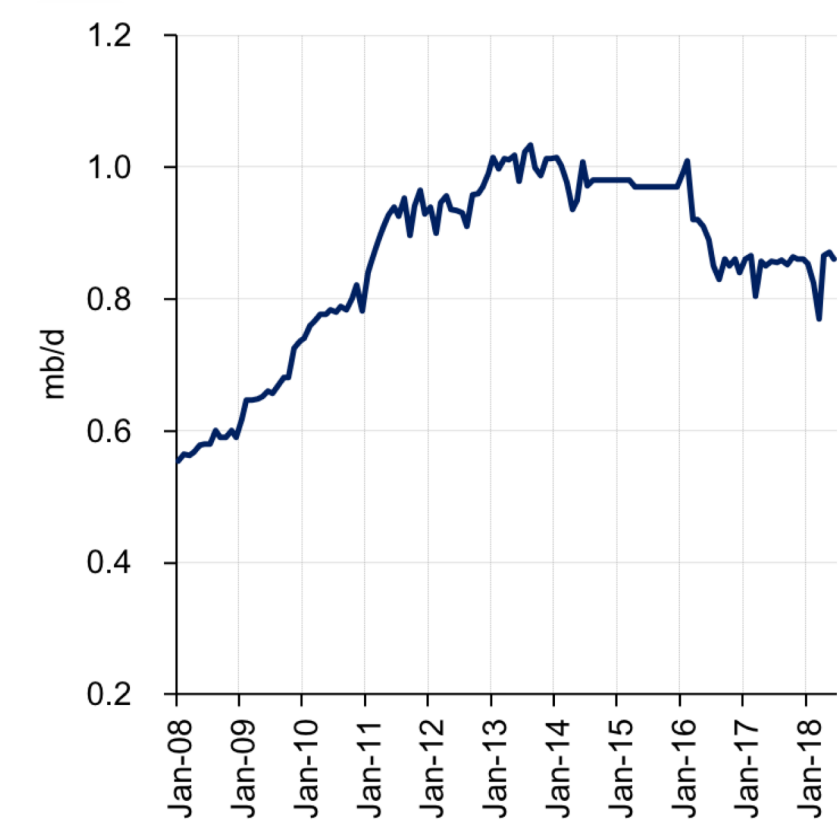
# Declines have been large and will take time to reverse

China oil output, Jan 13 – Jun 18

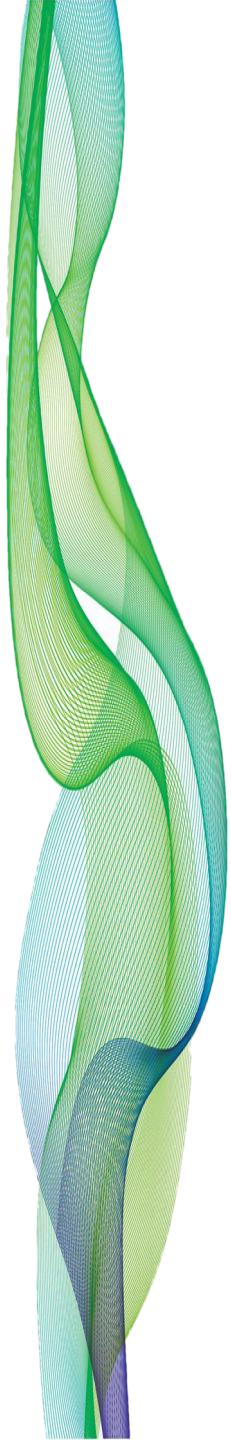


China’s oil output has been in decline despite efforts to stabilize output.

Colombia oil output, Jan 08 – Jun 18



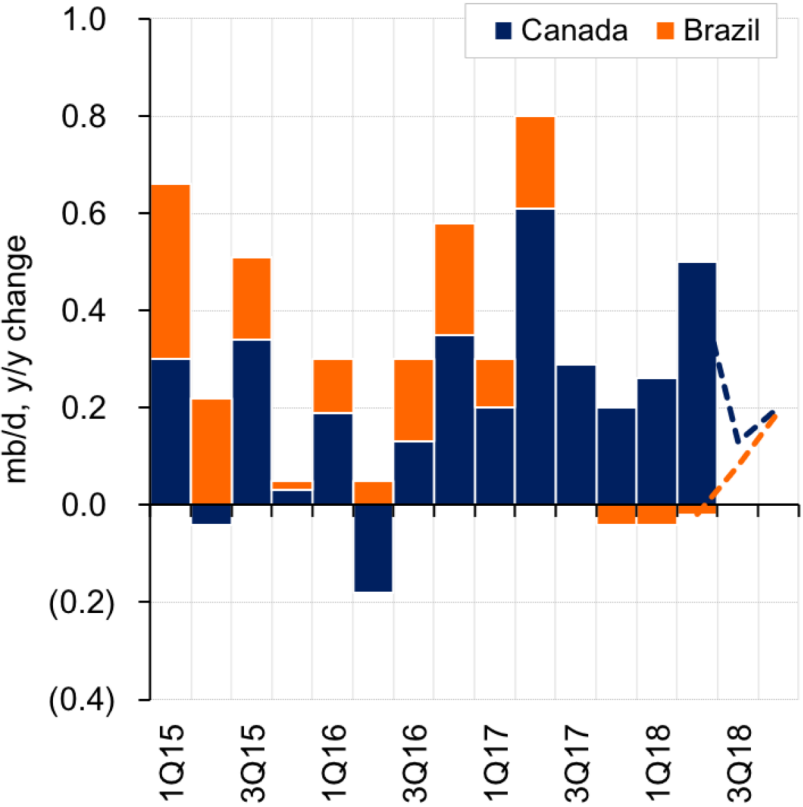
Following periods of rapid expansion, Colombian output has fallen sharply as a result of Capex cuts and disruptions but has recently stabilized.





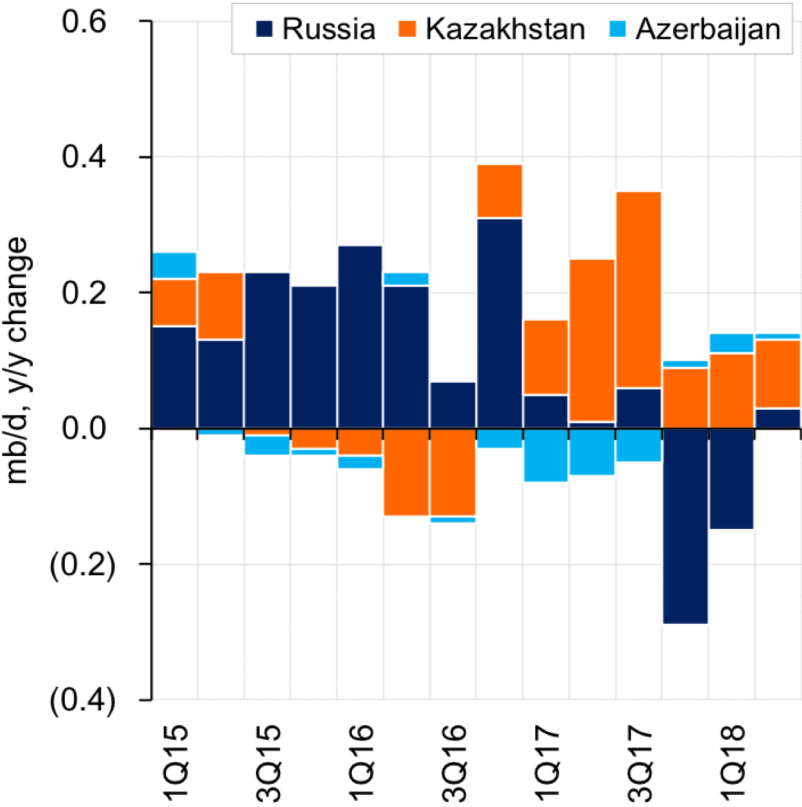
# Pockets of non-OPEC supply growth (excl. US)

Canada and Brazil oil output, 1Q15 – 4Q18E



Canada and Brazil will remain the main sources of supply growth going forward, though Brazil's contribution to growth so far this year has been fading.

FSU oil output, 1Q15 – 2Q18

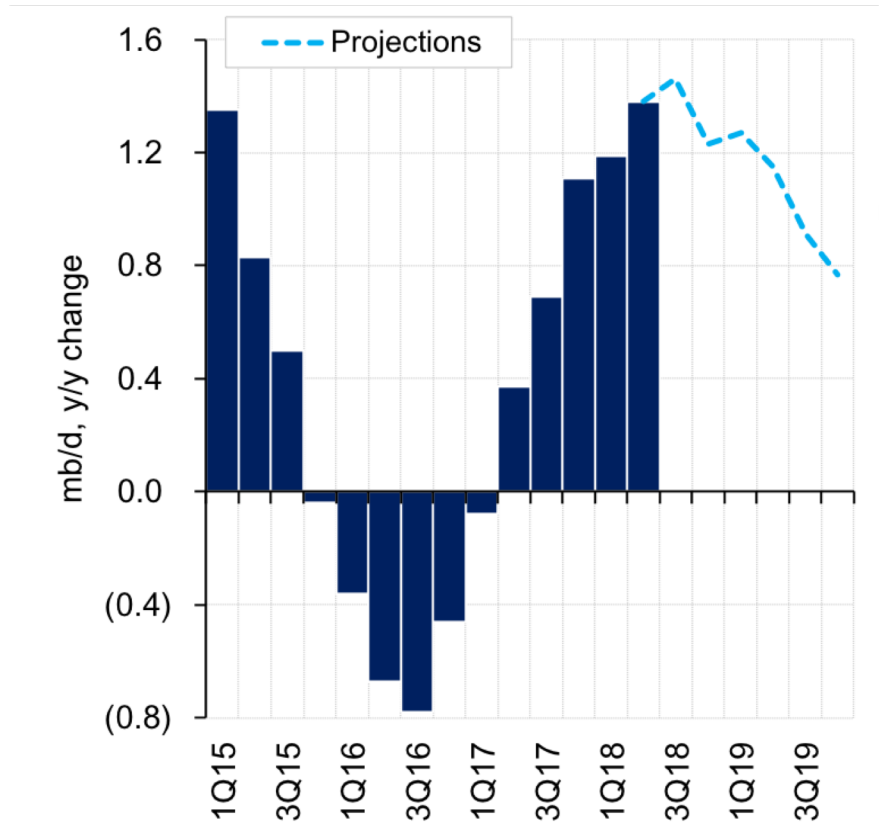


Production growth in Russia has slowed and turned negative in 4Q17 after massive increases a year earlier, offsetting the strong 2017 y/y increases in Kazakh output; this was reversed in 2Q18.



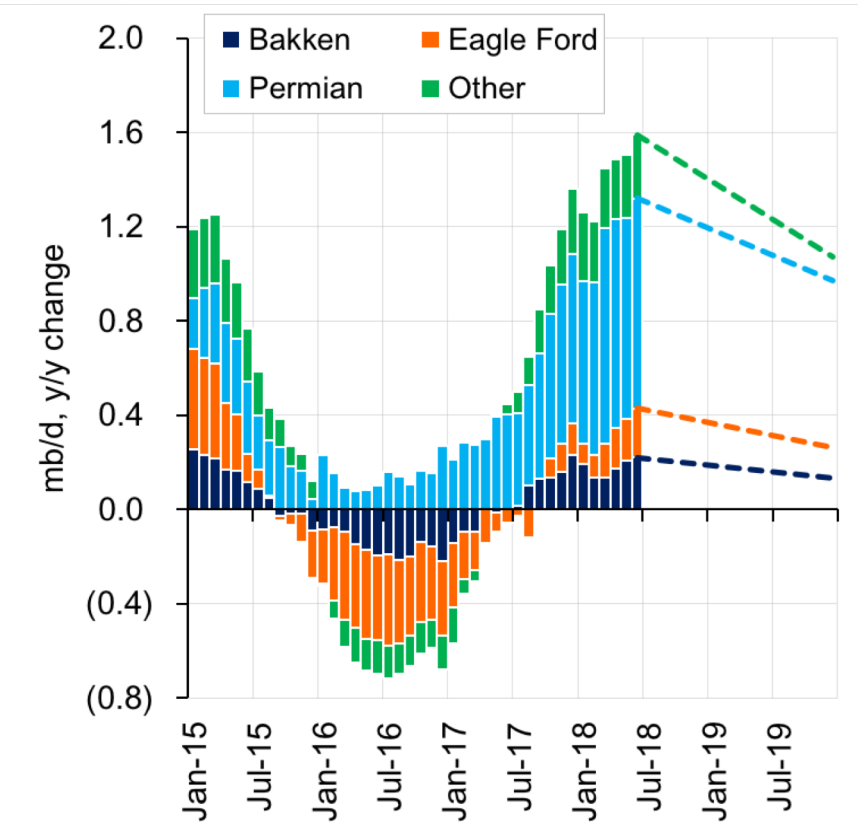
# US shale will continue to grow

Total US oil output, 1Q15 – 4Q19E

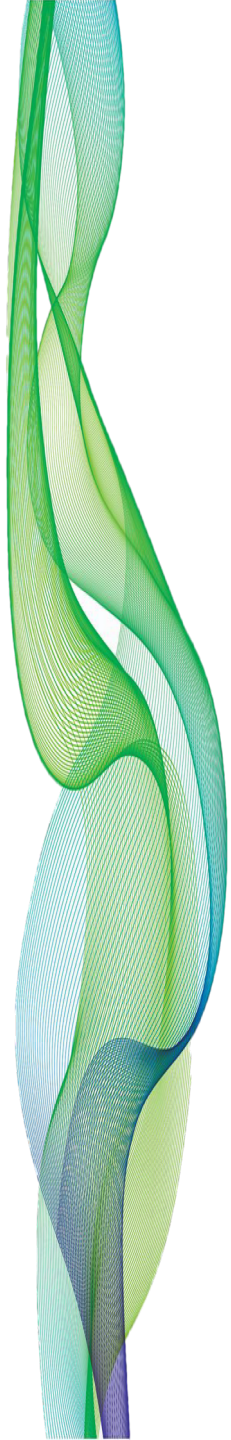


EIA projects that US production will continue to grow in 2018 and 2019, approaching close to 12.0 mb/d.

US shale oil output, Jan 15 – Dec 19E



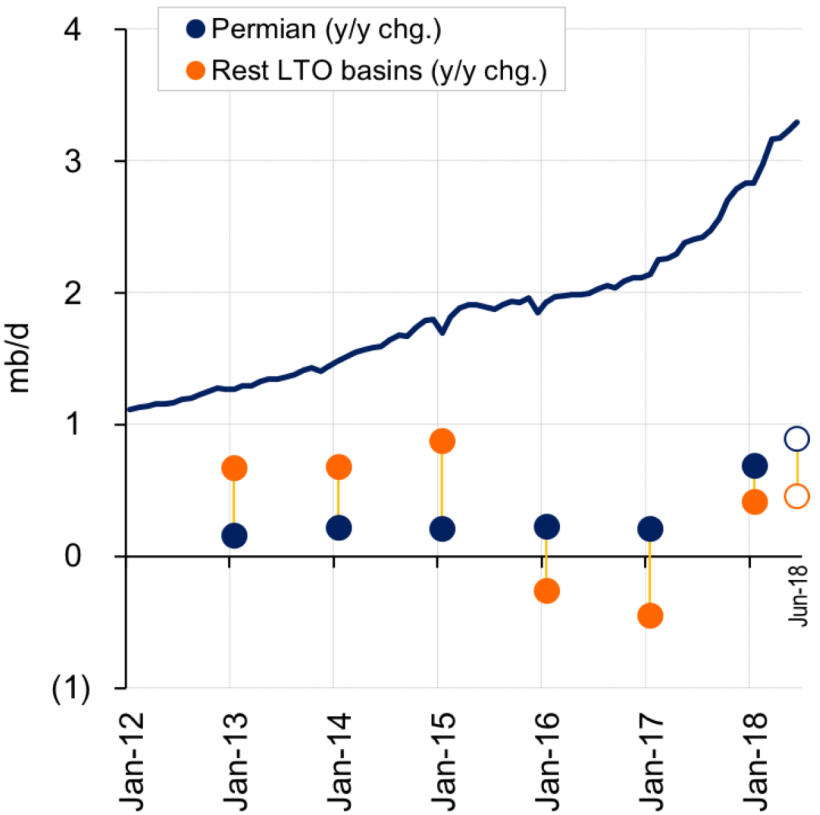
US output growth has been driven across all major shale basins including primarily, the Permian, the Bakken and the Eagle Ford.





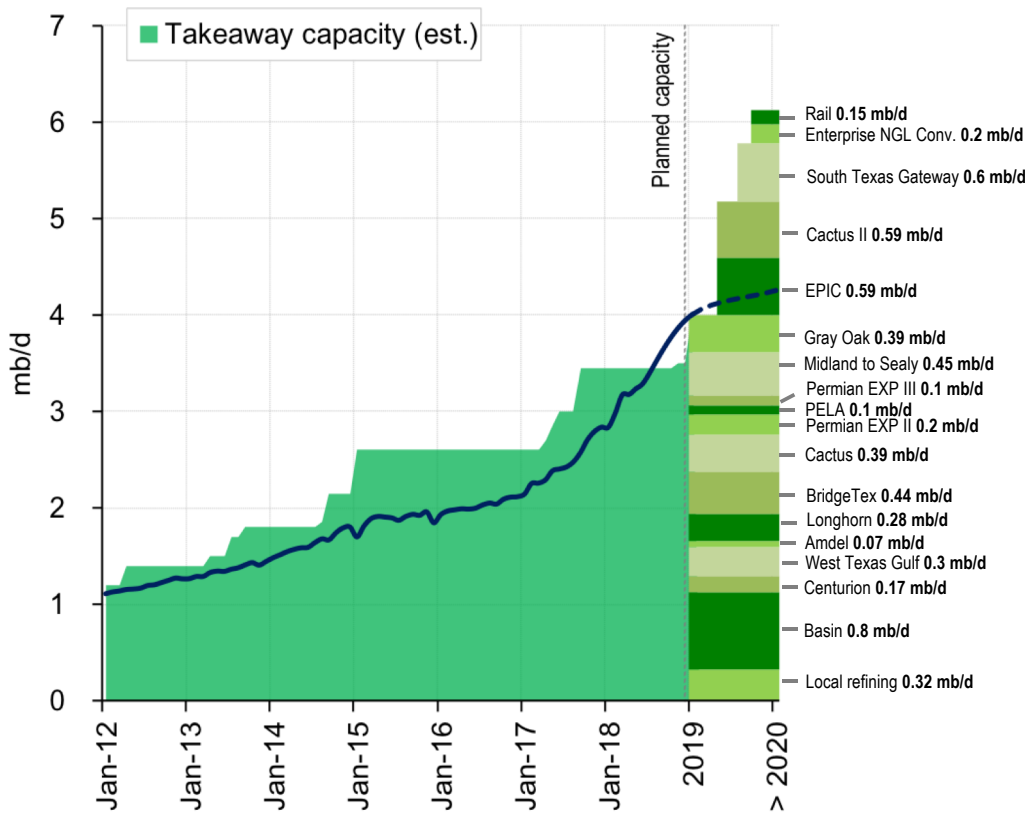
# Permian leading the growth but infrastructure constraints biting

Permian oil output, Jan 12 – Jun 18



The Permian basin has been leading the growth reaching 3.3 mb/d in June 2018 and EIA expects Permian production to reach 4.0 mb/d by 2019.

Permian production vs takeaway capacity, Jan 12 – 2020E



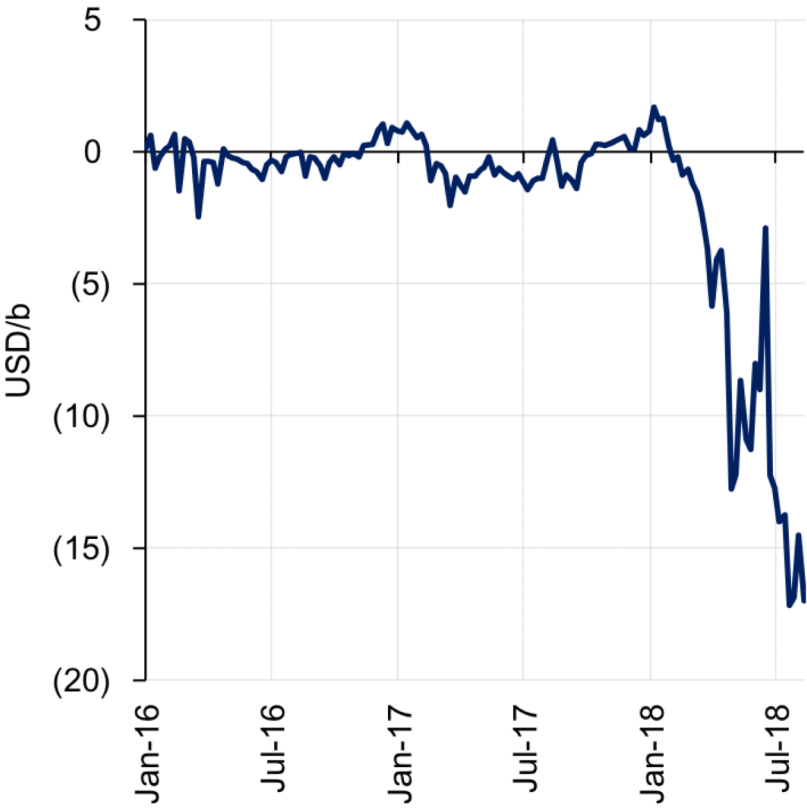
But infrastructure constraints are putting a cap on production growth in 2018, which is unlikely to be fully alleviated until 4Q19 as more takeaway capacity is built.





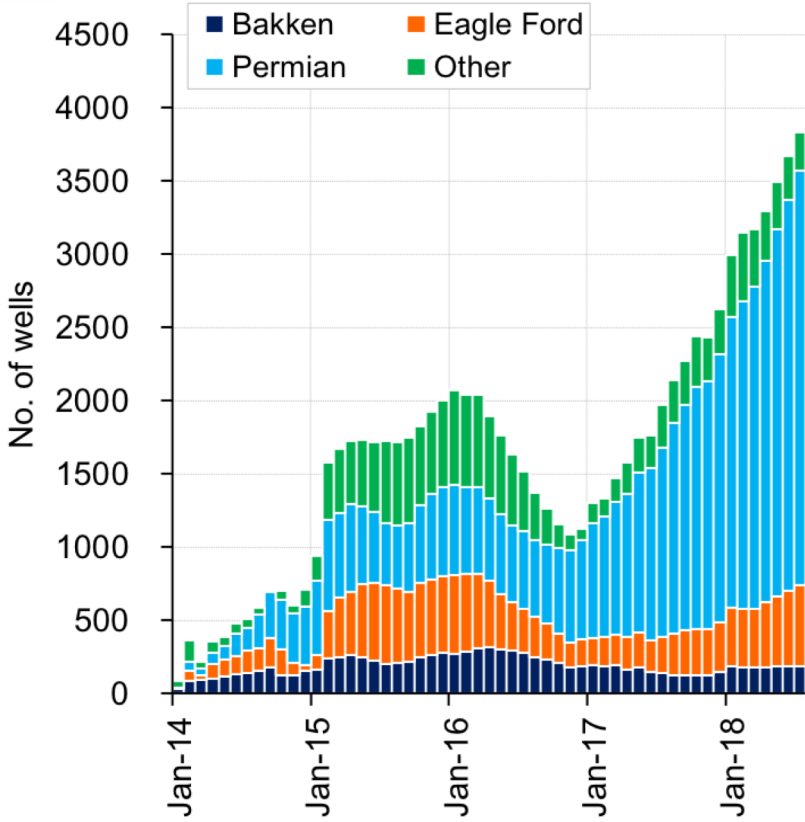
# The price impact of the Permian bottlenecks

WTI Midland to NYMEX WTI, Jan 16 – Aug 18

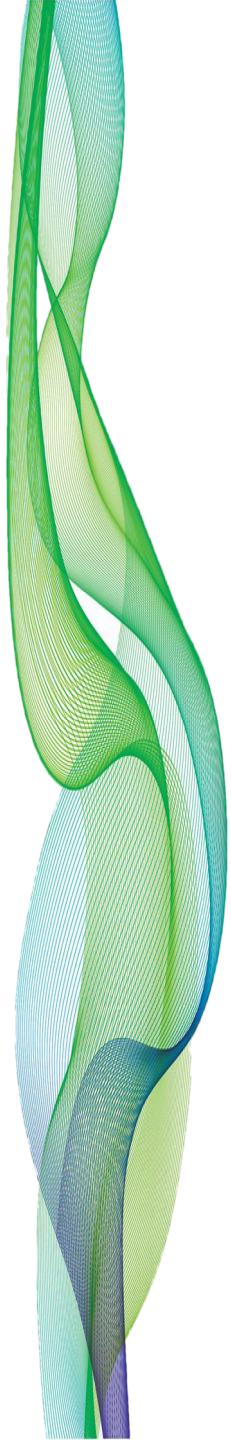


These infrastructure constraints have caused the WTI Midland to trade at a large discount to NYMEX WTI.

DUC inventory, Jan 14 – Jul 18



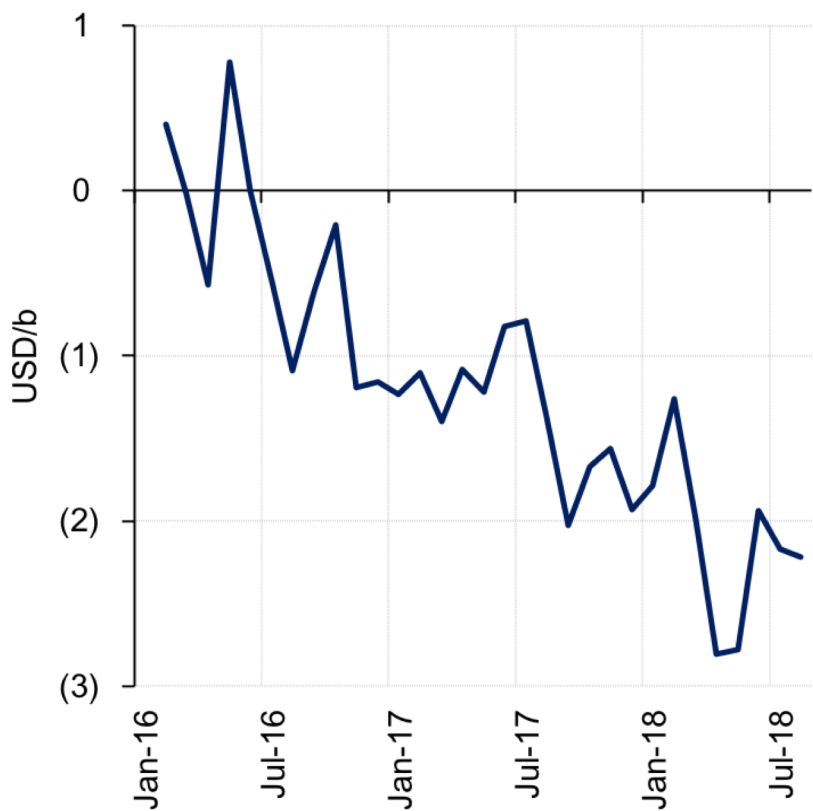
DUCs have been steadily climbing for the Permian, as producers defer production until new takeaway capacity in place becomes available; some are moving rigs to other plays such as the Bakken and Eagle Ford.





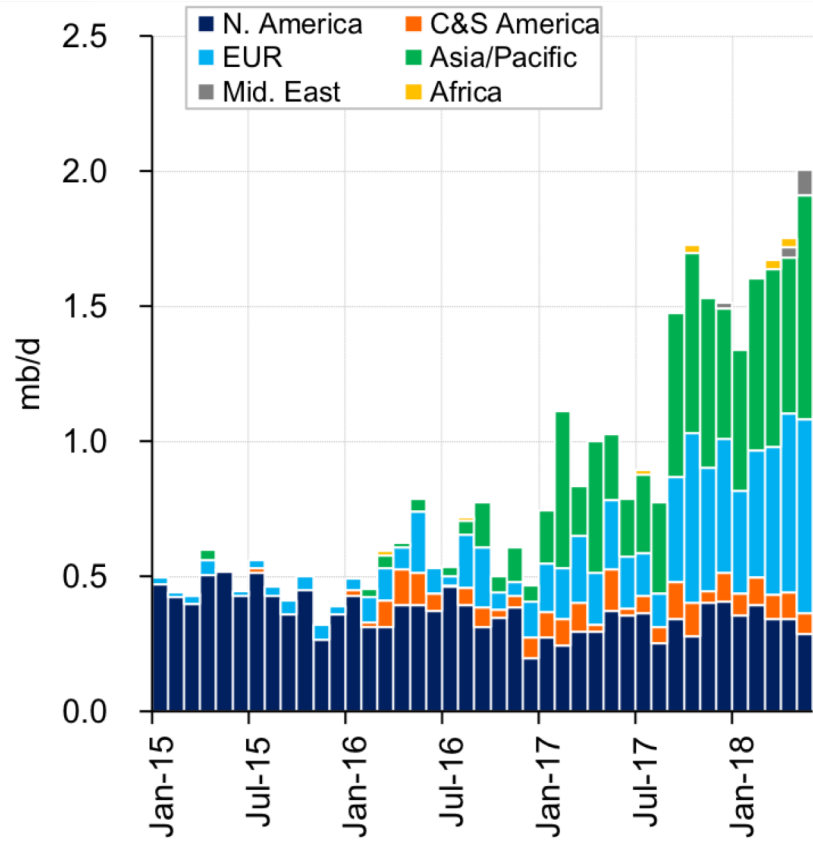
# US crude exports at record levels

MEH – Brent export arb, Jan 16 – Aug 18

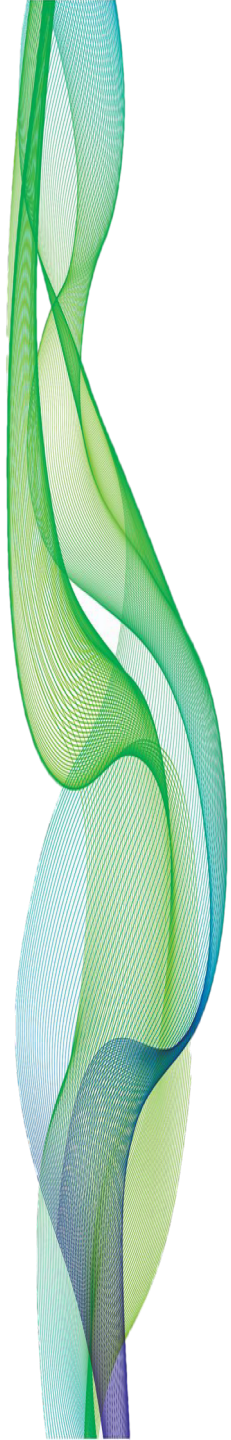


Spreads have widened opening the arb with US crude exports rising to historical levels.

US crude exports by destination, Jan 15 – May 18



US crude exports have been reaching Asia and Europe, putting pressure on Brent and light sweet crudes.





# OPEC behavior: The key market dynamics to look out for



# Shift in Saudi Arabia output policy

## The dynamics of the Saudi oil output policy in 2018

- Until February 2018 the message from Saudi Arabia was: “while crude stocks have fallen, it is premature to exit from the production deal and if producers ‘err on the side of overbalancing, **then so be it**”.

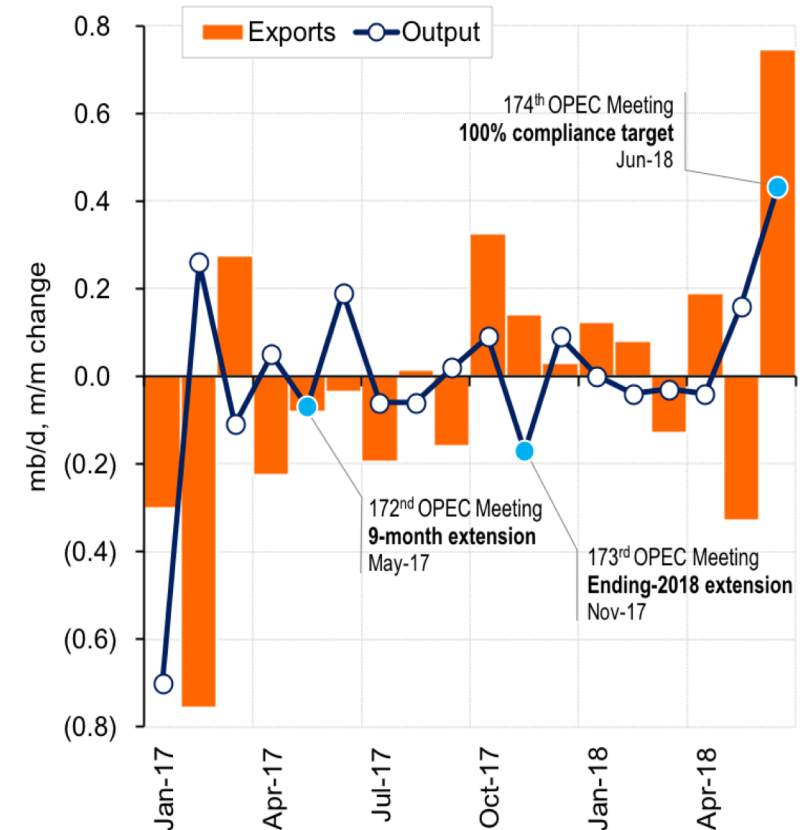
The key question at the time was whether the 5-year average of OECD stocks is an effective guide for OPEC oil output policy.

- In May, President Trump announced the US withdrawal from the Joint Comprehensive Plan of Action (JCPOA) and Saudi Arabia welcomed the decision.

Despite the initial heightened uncertainty surrounding the size of the potential loss of Iranian barrels, as time passed it was becoming clear that the losses would be bigger than originally thought.

Sharp shift in Saudi Arabia’s oil output policy in May: the Saudis showed signs of willingness to ease the supply curbs and declared that the Kingdom is willing to do **what is necessary** to reassure consumers.

## Saudi oil output and exports, Jan 17 – Jun 18



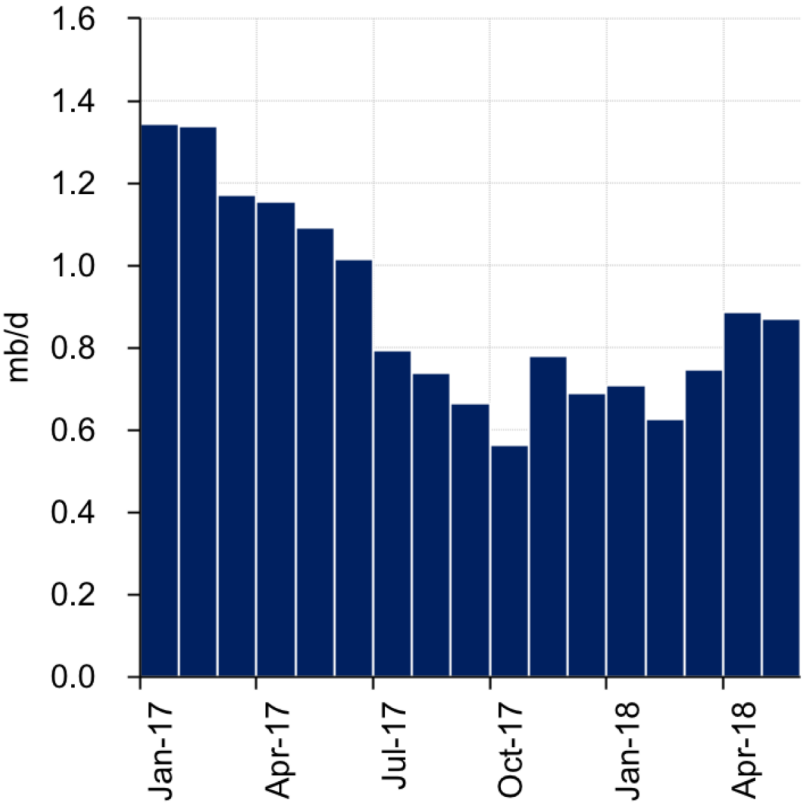
Saudi Arabia ramped up its production and exports in June, pre-empting any losses from Iran and pushing more oil into the market.





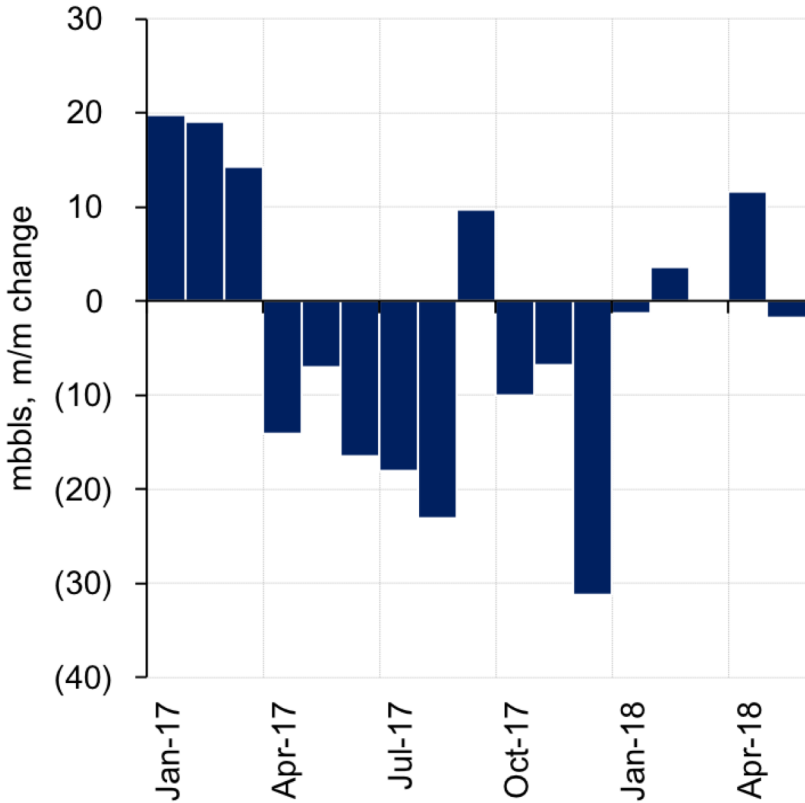
# Saudi crude exports to the US increase

US crude imports from Saudi Arabia, Jan 17 – May 18

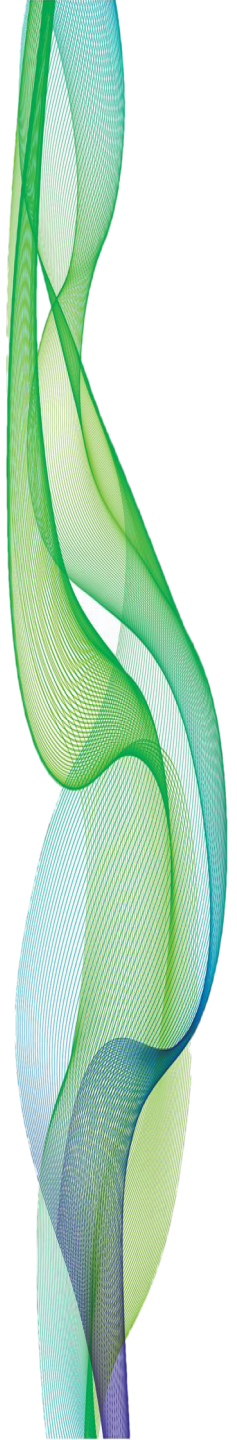


Saudi Arabia’s crude oil exports to the US have been on the rise in 2018, after months of decline in the year before.

US crude oil stock changes, Jan 17 – May 18



In the first half of 2018 the stock draws in the US, which is the most visible hub, have slowed down.





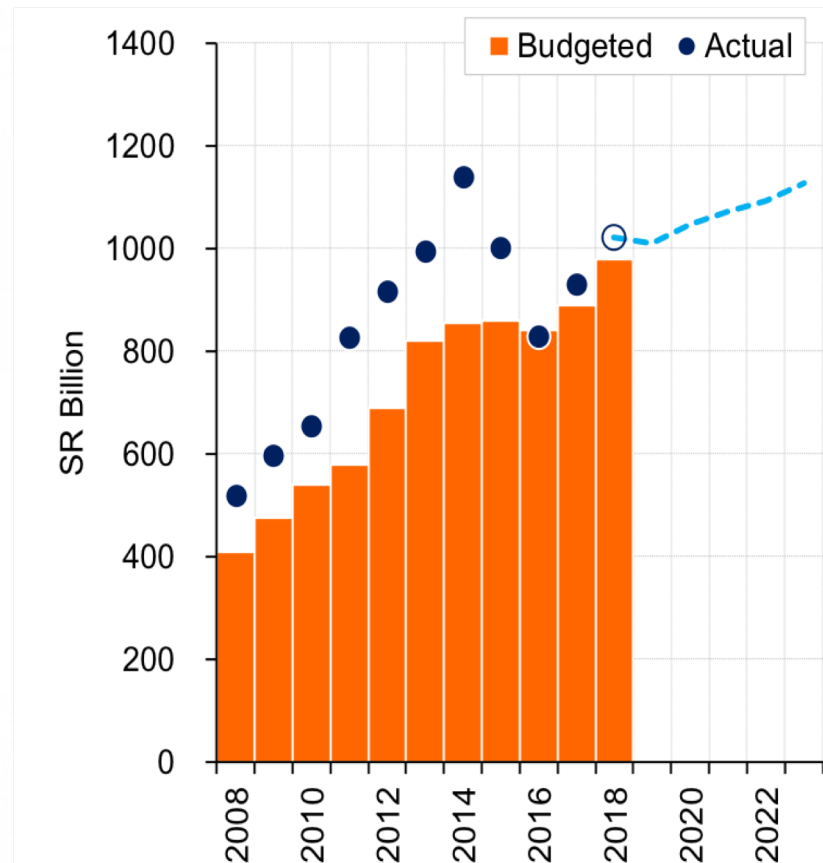
# The Saudi balancing act

## A fine balance between multiple objectives

1. Not to risk the rebalancing of the market and pushing prices too low, as this is vital for the Saudi economy and for the stability of the crude oil market.
2. To maintain the current framework of cooperation with OPEC and non-OPEC producers, an agreement which Saudi Arabia worked very hard to put together and wishes to maintain for the long-term.
3. To meet any potential shortages in the market caused as a result of supply disruptions and to ensure market stability reassuring consumers.
4. To be responsive to consumers' concerns about rising oil prices, the most vocal of which has been the US. The Saudis supported the US withdrawal from the Iranian nuclear deal and value their alliance with the US as a means of enhancing their regional position.

The weights attached to these objectives are not equal and most importantly each weight tends to change over time.

Saudi Arabia government spending, 2008 – 2023E





# Floor, ceiling and narrow price range

## Saudi Arabia tries to manage price within a narrow range

- Fears of oversupplying the market and sharp fall in the oil price especially in light of increasing risk of trade war: **timing mismatch**.
- Offer of extra light crude was not taken by refineries.
- Change in message: “Fears that Saudi Arabia would flood the market were without basis and July production would not rise much higher than June numbers”. In fact, July production fell to 10.3 mb/d from 10.5 mb/d, a drop by 200,000 b/d and exports expected to fall further in August.

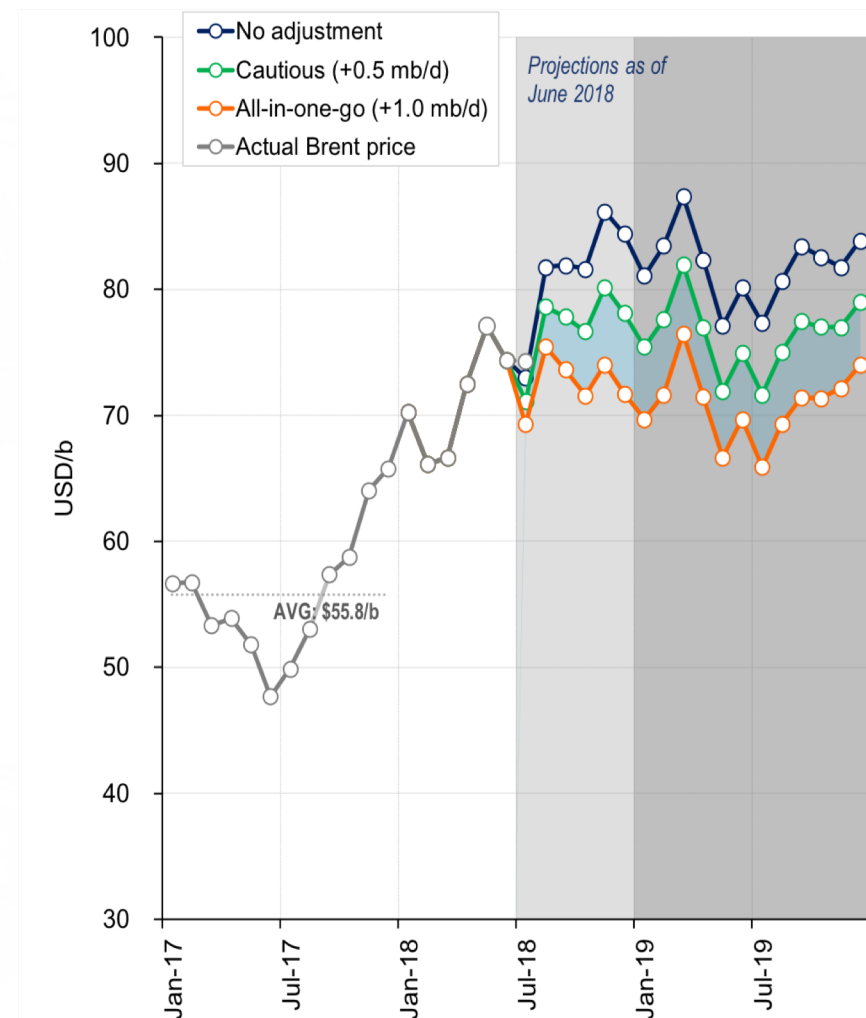
Saudi Arabia is trying to manage the oil price within a very narrow range between \$70/b to \$80/b.

↑. Saudi Arabia would like to put a cap on the oil price due to concerns about high oil prices on demand and to reassure consumers.

↓. Saudi Arabia would like to maintain a floor on the oil price to support revenues and to sustain market stability.

Expect more shifts as the weights on the different objectives change over time and different shocks hit the oil market.

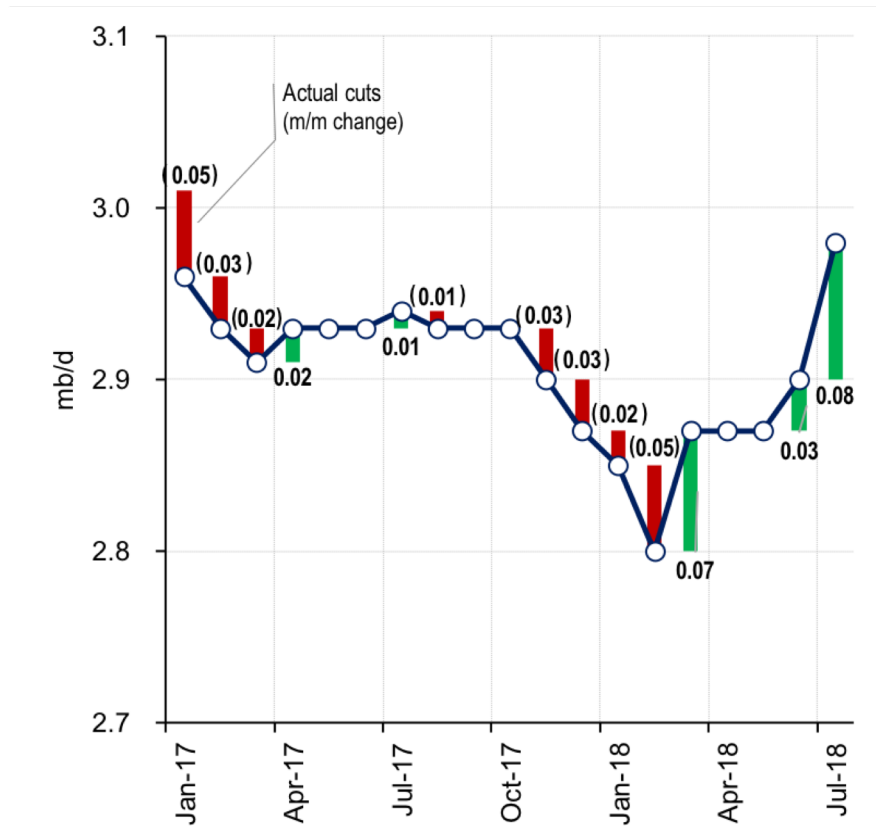
## OPEC output policy scenarios, Jan 17 – Dec 19E





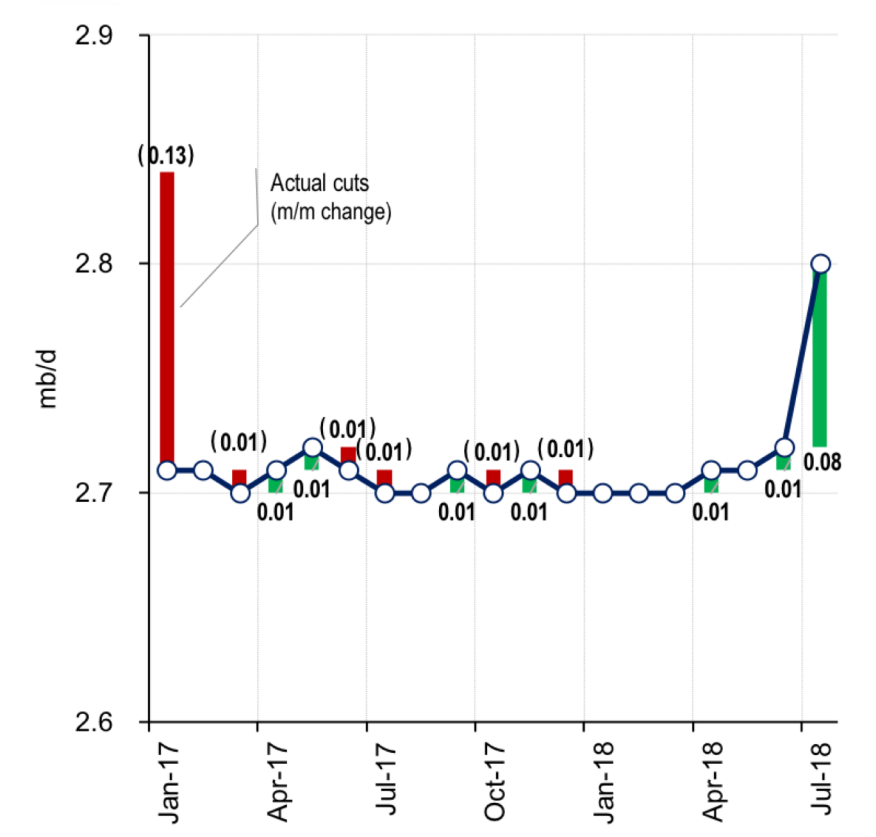
# Those who can increase output did increase

UAE oil output, Jan 17 – Jul 18

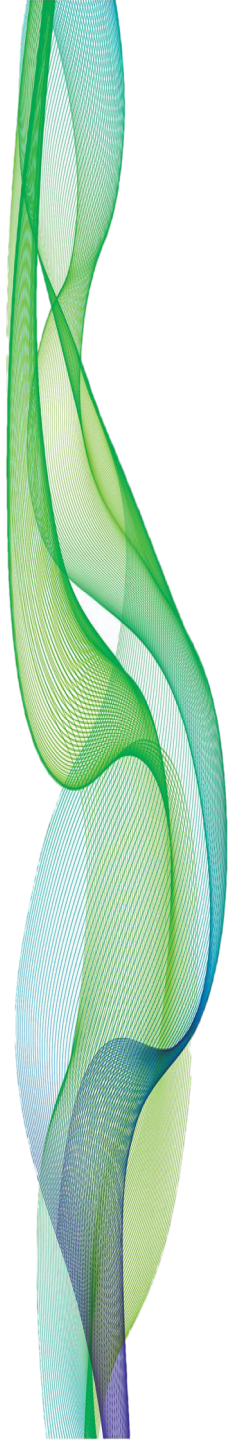


UAE production averaged 2.98 mb/d in July an increase of 85,000 b/d from June levels and of 110,000 b/d since May.

Kuwait oil output, Jan 17 – Jul 18



Kuwaiti crude oil production stood at 2.8 mb/d in July, up by more than 80,000 from June levels.

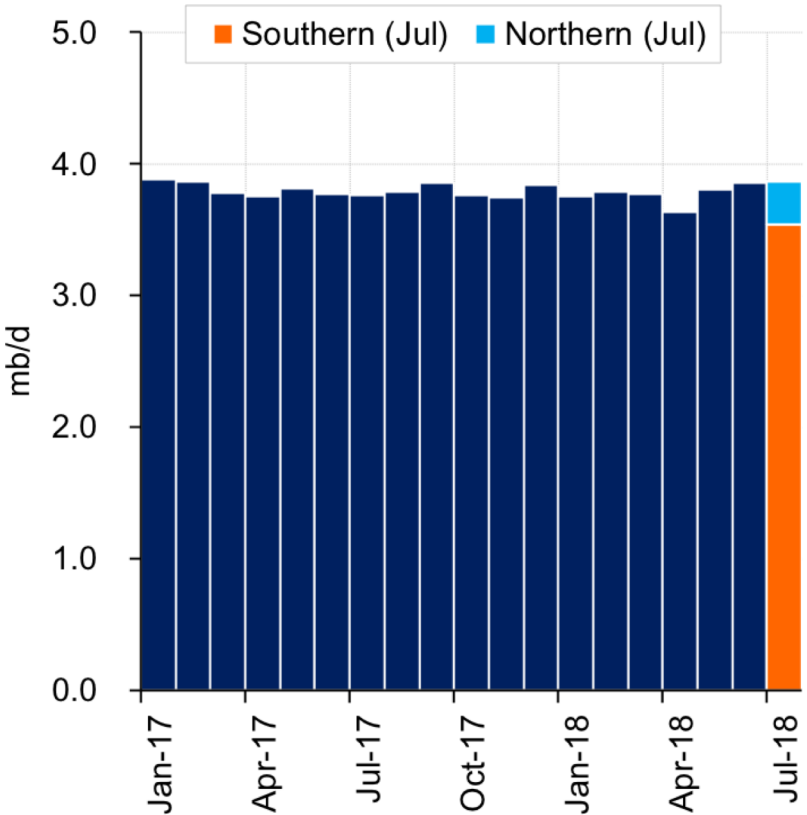






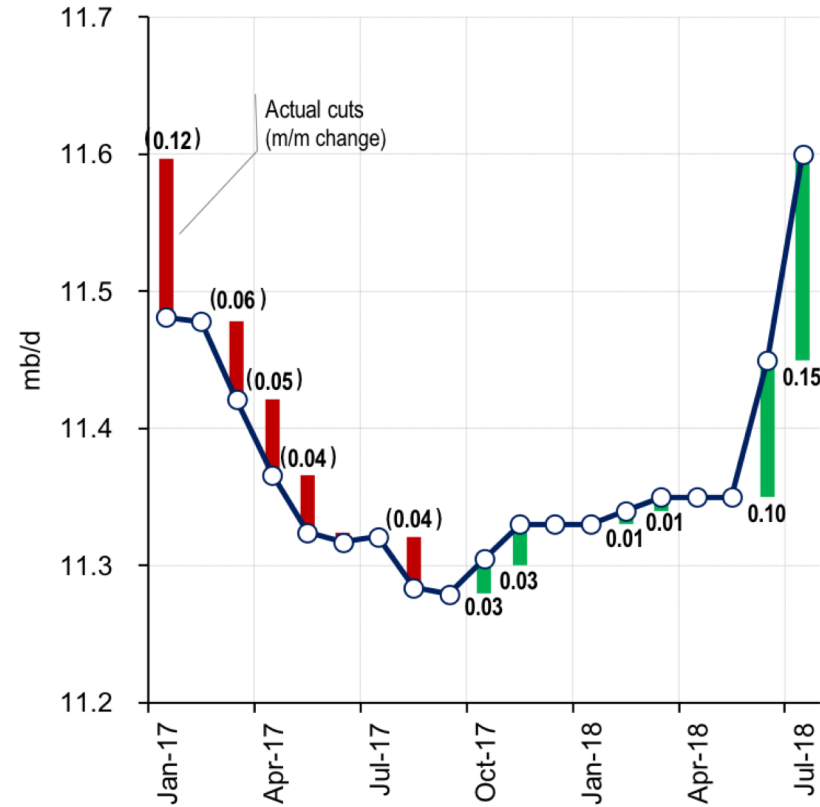
# Producers outside the GCC core also increased

Iraqi crude oil exports, Jan 17 – Jul 18



Iraqi crude oil exports in July surged to 3.9 mb/d, of which southern exports accounted for a record-high 3.54 mb/d.

Russia oil output, Jan 17 – Jul 18

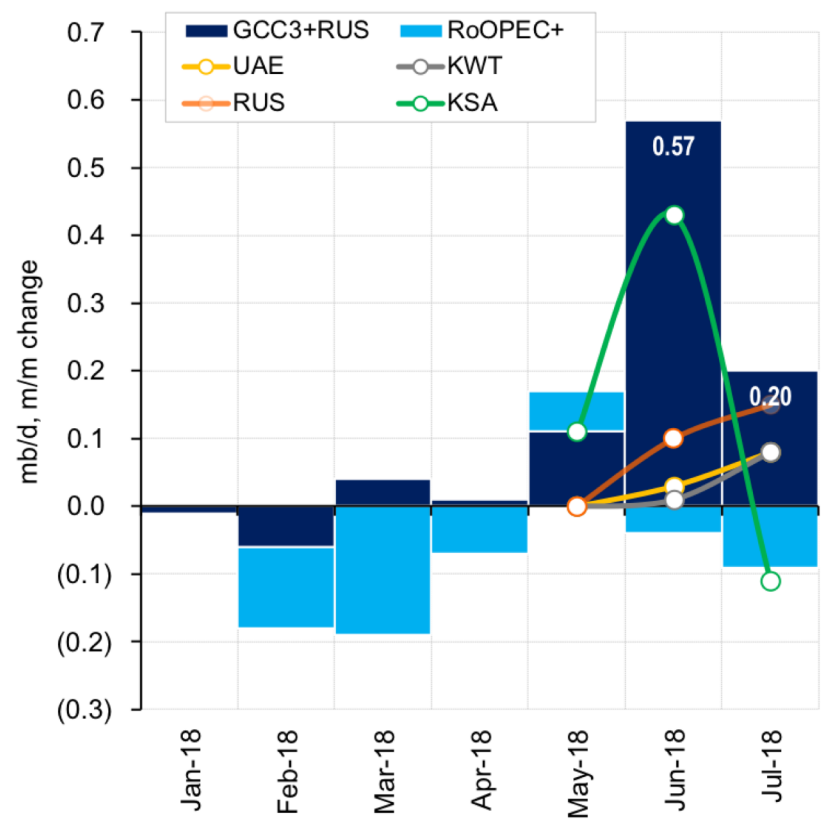


Russia increased its output by as much as 0.25 mb/d since May 2018.



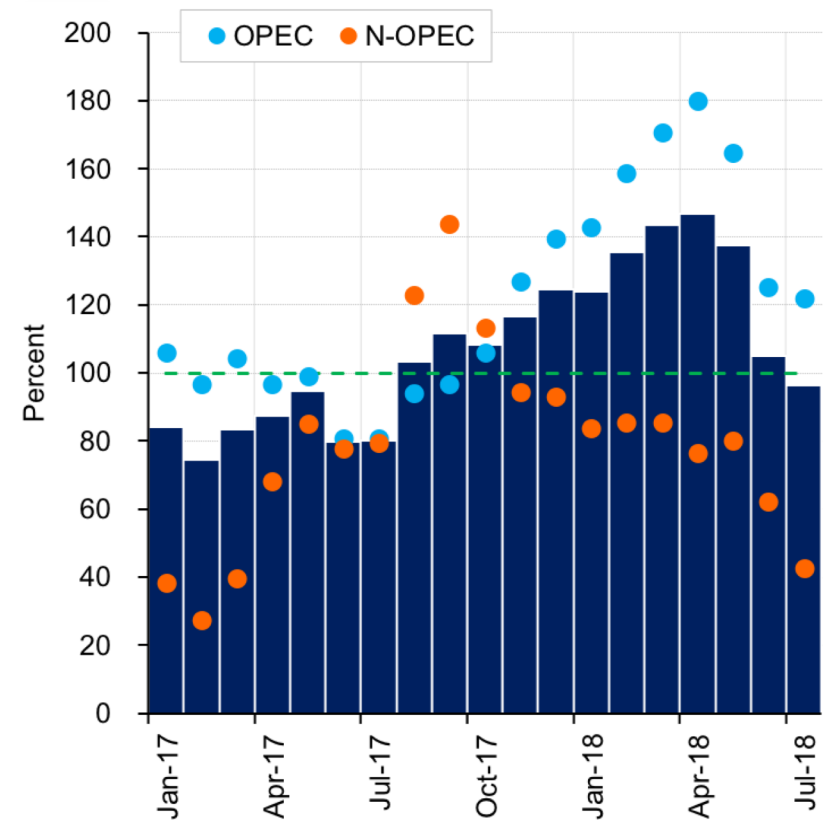
# OPEC+ compliance close to 100%

GCC core and Russian production, Jan – Jul 2018



Overall the increase in Saudi, UAE, Kuwaiti and Russian production reached 0.6 mb/d in June, that is half the entire OPEC cut target of 1.19 mb/d.

OPEC+ compliance, Jan 17 – Jul 18



OPEC+ compliance fell near target in June 2018, at 105% before retreating further to 97% in July.

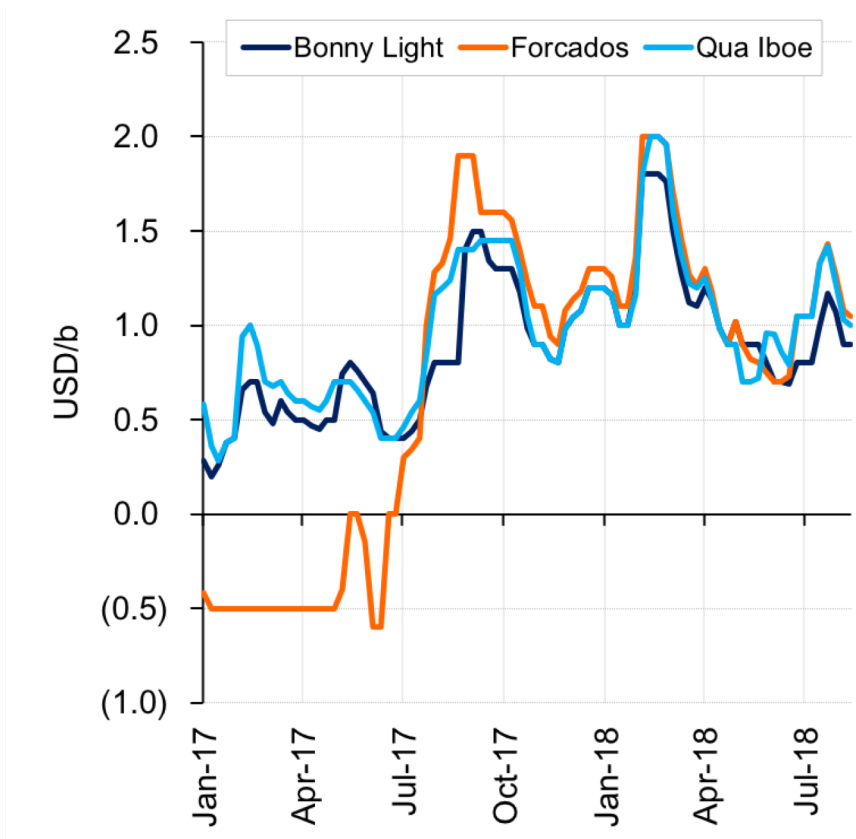


## Clearing the light-sweet crude surplus



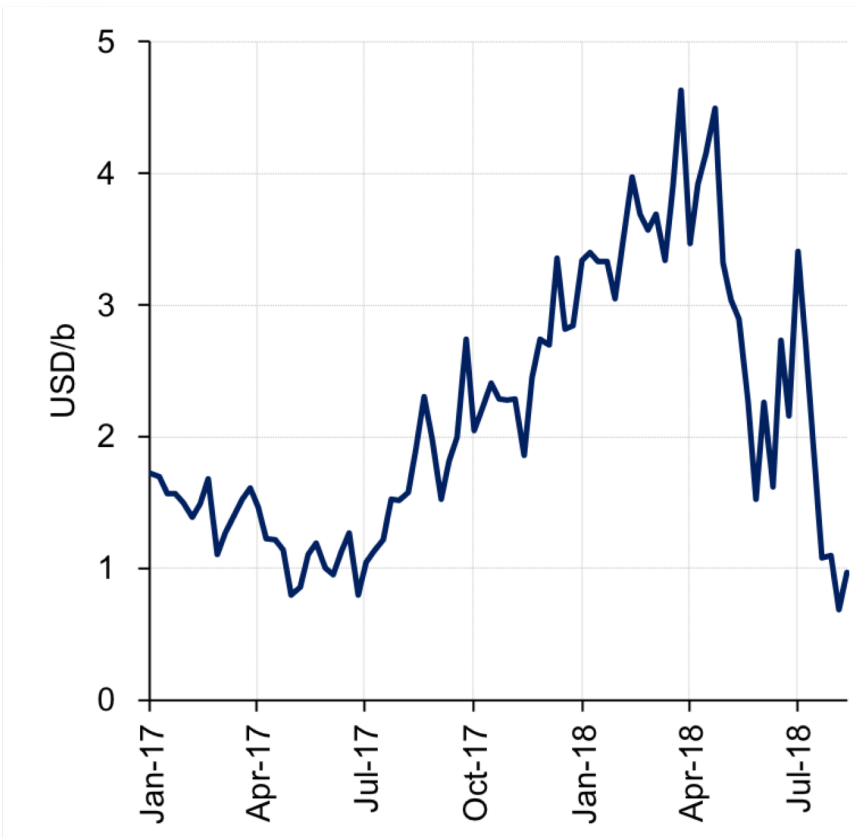
# Light-sweet crudes came under pressure

Nigerian crudes diff to Dated Brent, Jan 17 – Aug 18

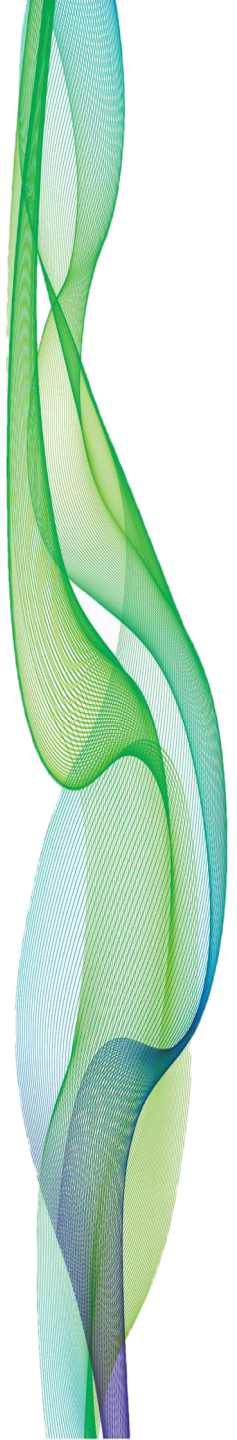


With the recovery of Libyan output after a temporary disruption and more light sweet crude on offer from Saudi Arabia and UAE, light crudes in Atlantic basin have come under pressure.

Brent-Dubai spread, Jan 17 – Aug 18



Asian refineries are in need of heavier crudes; narrowing the Brent-Dubai will help clear some unsold cargoes in the Atlantic supporting physical differentials.

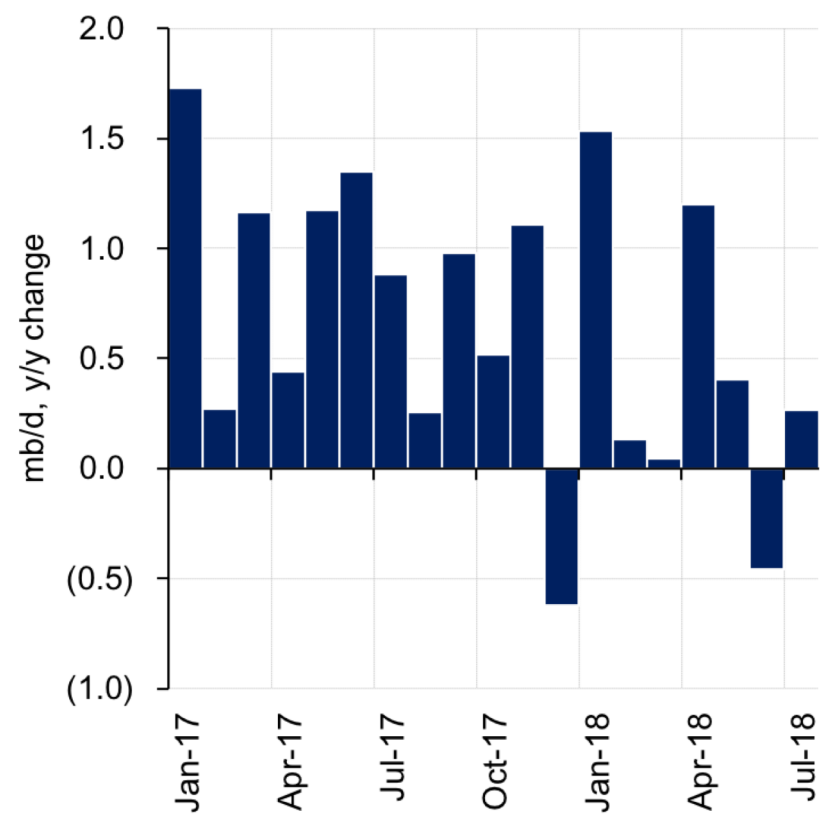






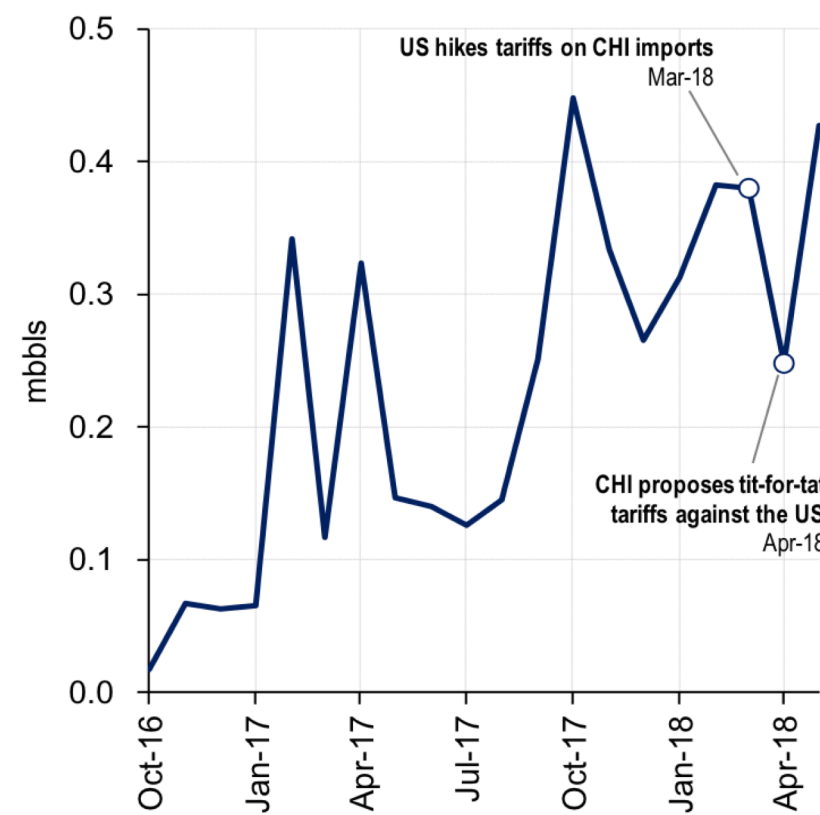
# Chinese imports became murkier

Chinese crude oil imports, Jan 17 – Jul 18



China's crude imports have been slowing recently which has meant that the clearing mechanism of the light sweet crude has been slow.

US crude oil exports to China, Oct 16 – May 18

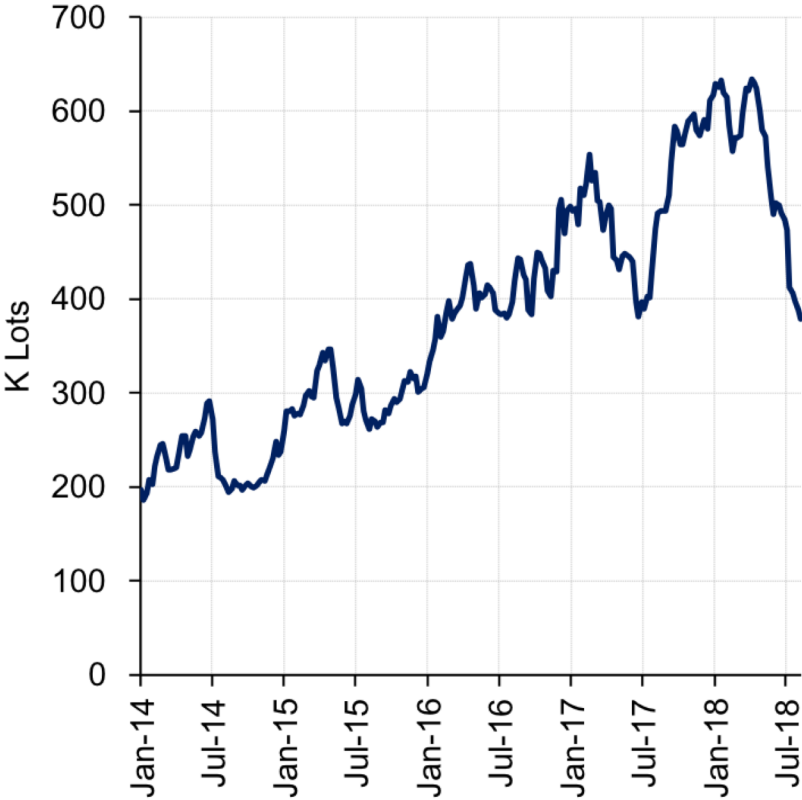


US-China trade war affecting crude exports from the US to China, with US crude arriving in September expected to fall by more than 0.1 mb/d as the trade spat intensifies.



# Financial positioning

Brent managed money net longs, Jan 14 – Aug 18

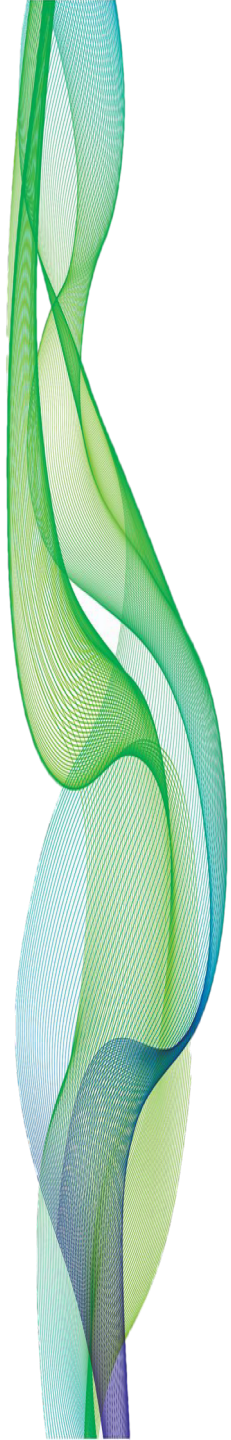


In the second-half of 2017, the net-long positions by hedge funds more than doubled to a new record level, betting that tighter supply-demand can push prices higher.

WTI managed money net longs, Jan 14 – Aug 18



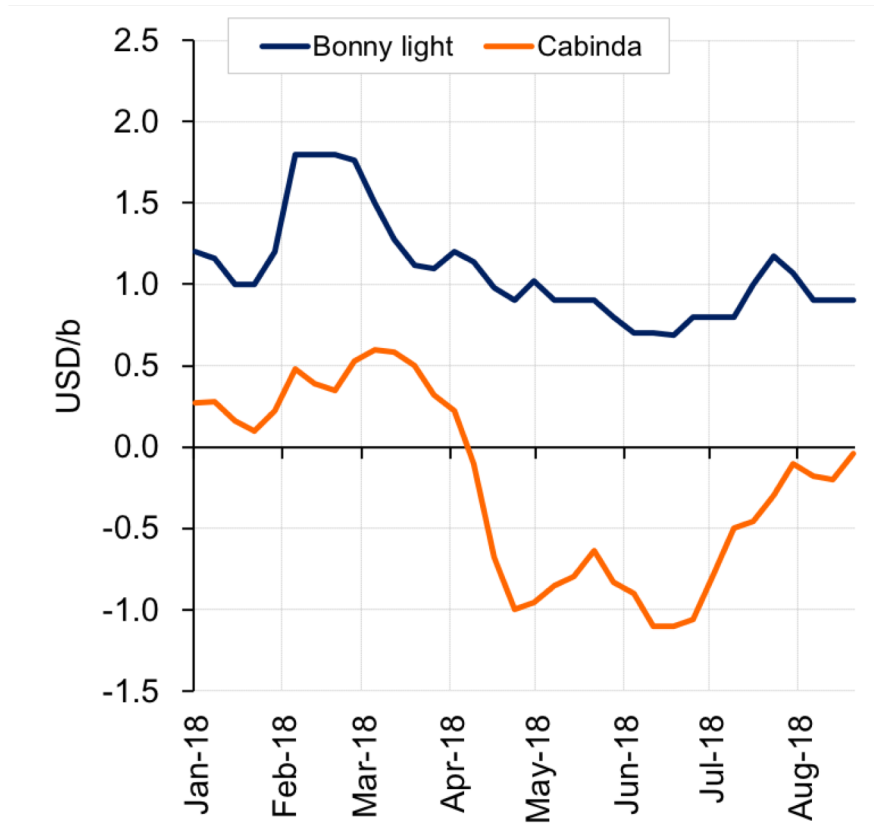
But in 2018, hedge funds backed-off and liquidated their net-long positions as signals became overly confusing, undercutting the bullish narrative.





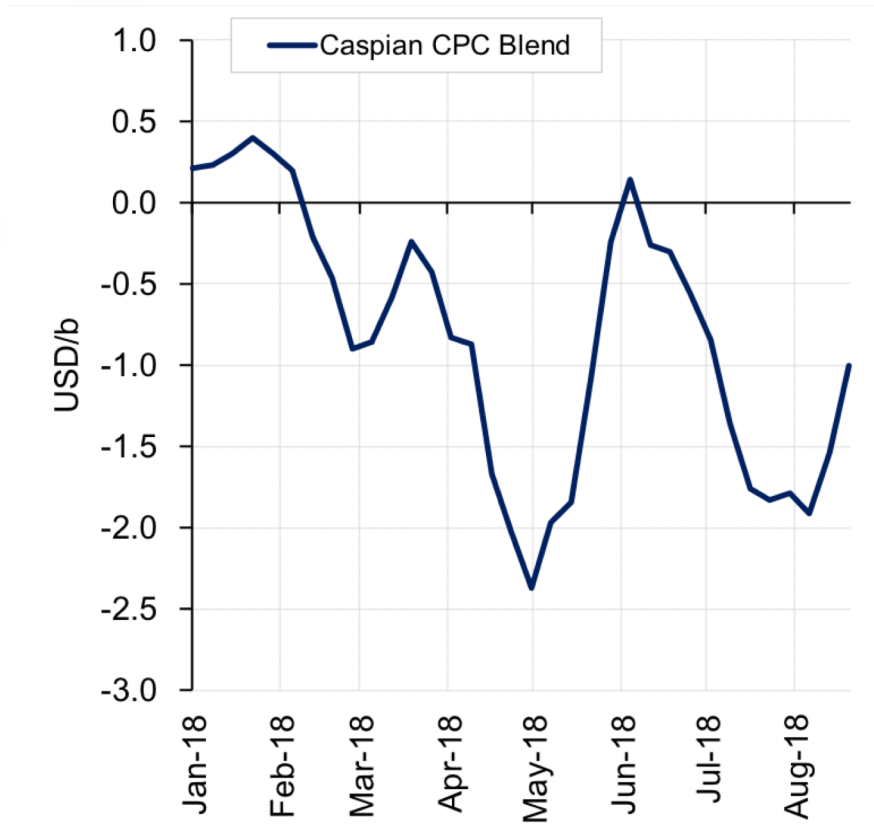
# Clearing the surplus began

Selected WAF crudes diff to Dated Brent, Jan – Aug 18

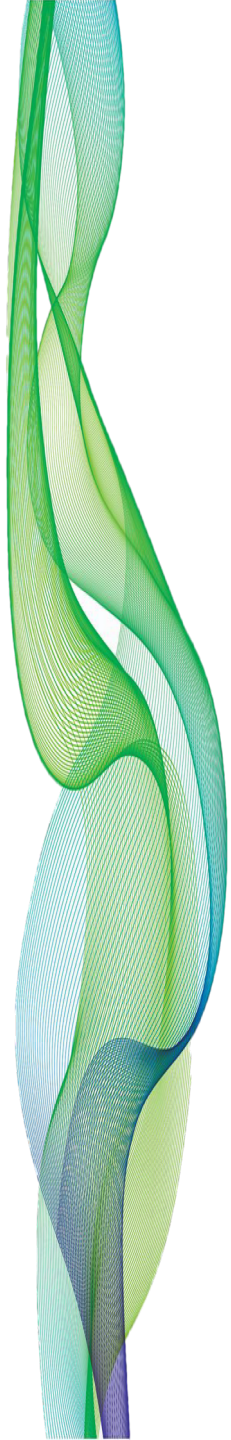


WAF differentials have been strengthening as large volumes are diverted towards Asia.

Caspian CPC Blend diff to Dated Brent, Jan – Aug 18



Caspian CPC Blend also strengthened amidst strong demand from Asia-Pacific.





# Geopolitical risks and oil prices





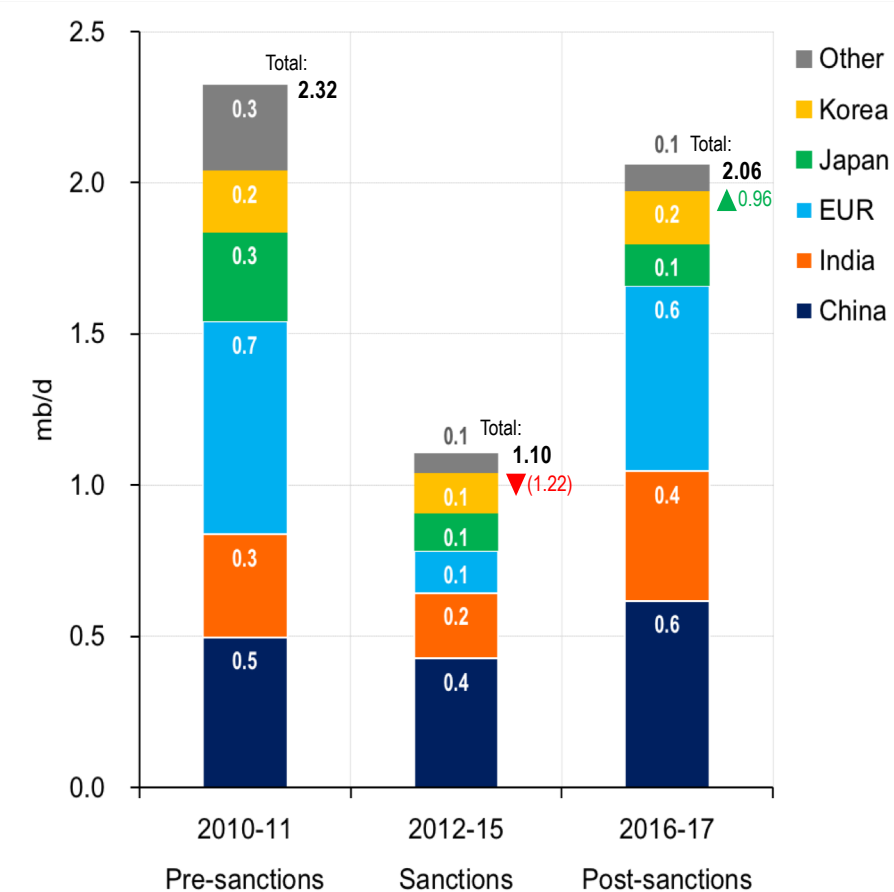
# The impact of the US withdrawal from the Iranian nuclear deal

## The potential of the Iranian losses feeds bullish views

- After sharp recovery following the lifting of the 2012 Iranian sanctions, Iranian exports are expected to fall sharply anew from August.
- Restrictions on USD payments, foreign banks, shipping insurance and products trade are forcing buyers to reconsider their business dealings with Iran.
- European, Japanese, South Korean and Taiwanese buyers are expected to comply; private refineries in India will also comply; whilst China said that it will maintain current import volumes.
- South Korea was first to bow to pressure in July, having lifted no crude or condensate cargoes from Iran.
- In August, President Trump stated publicly his willingness to meet with his Iranian counterparts “any time they want” with “no preconditions”, over muted concerns about the impact on prices amid the upcoming US Senate midterm elections in November.

Will Iran come to the negotiating table?

Iranian oil exports by destination, May – Jul 18





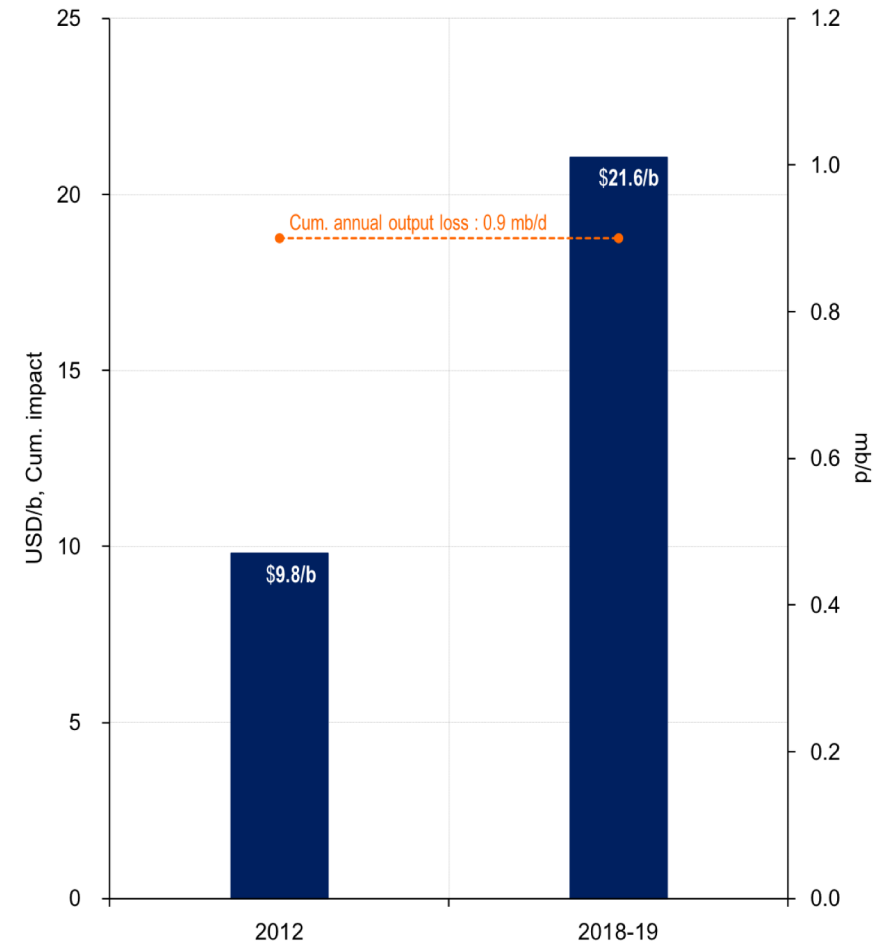
# The context matters

## The price impact could be twice as large as 2012

- Crude stocks have now declined to low levels below the 5-year average, offering limited buffer against the potential backdrop in supply.
- Spare capacity is very low both in current and historical terms, especially relative to global demand.
- If the new round of US sanctions were to result in the same size of losses in Iranian production as in 2012, the impact on oil prices under current market conditions would be twice as large.
- Within a year, the oil price could increase by \$21/b, all else remaining equal, compared to the actual impact of about \$10/b experienced back in 2012.
- Even conservative estimates of the potential Iranian losses do not eliminate the risk of sharp oil price rises.

In a tight market characterised by falling stocks and low spare capacity, supply disruptions are expected to have a much bigger impact on prices.

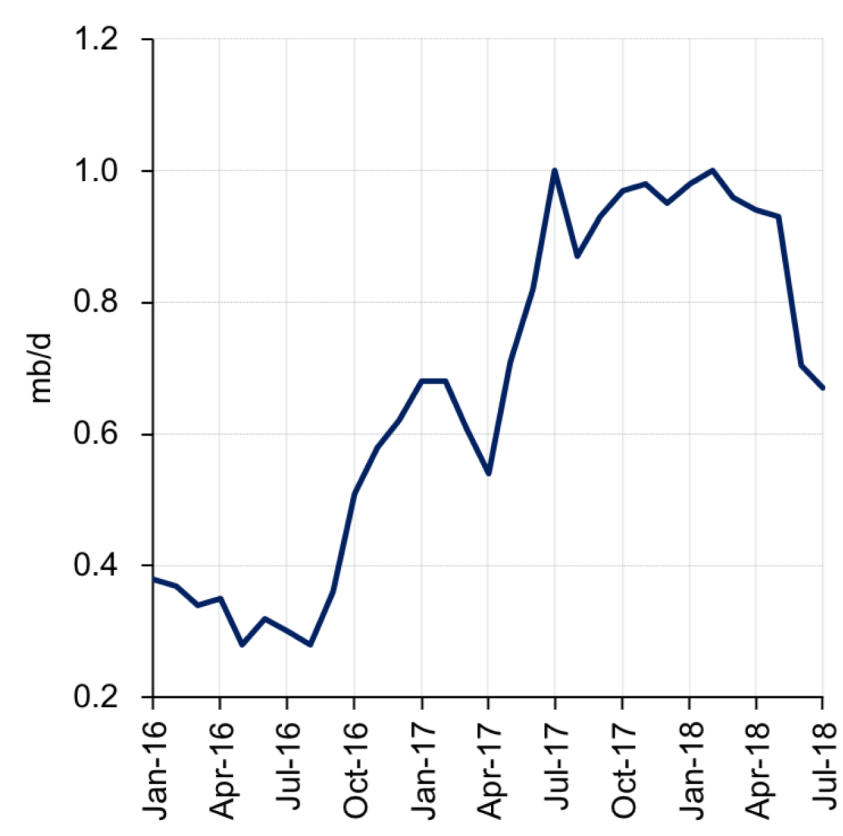
## Comparison of the price response to the US sanctions on Iran between 2012 and 2018-19





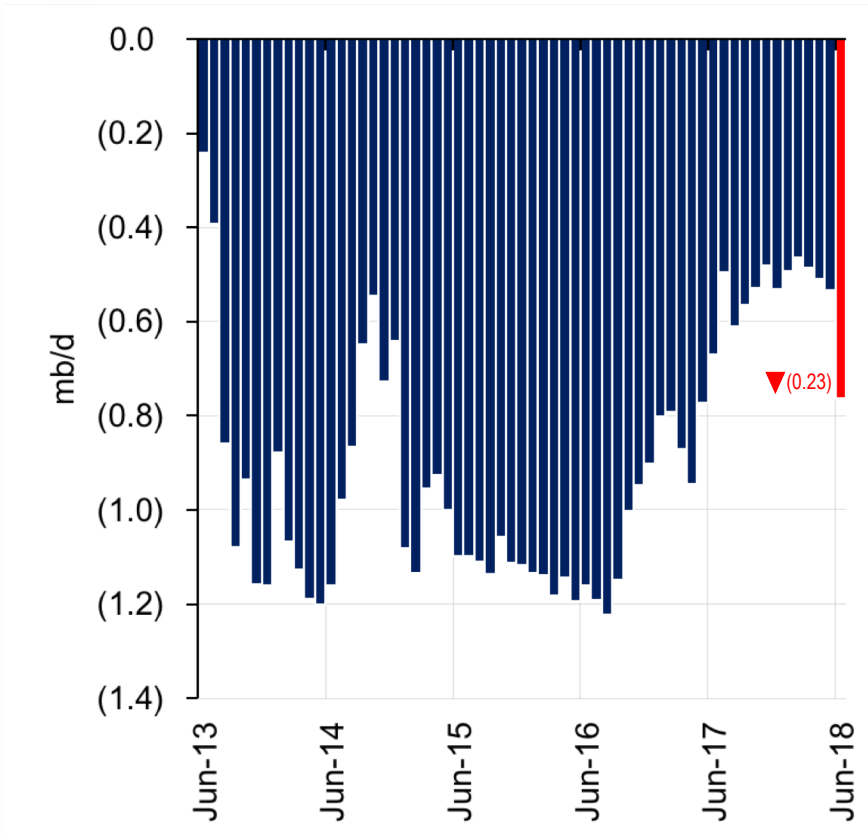
# Libyan oil output rises but recovery remains fragile

Libyan oil output, Jan 16 – Jul 18

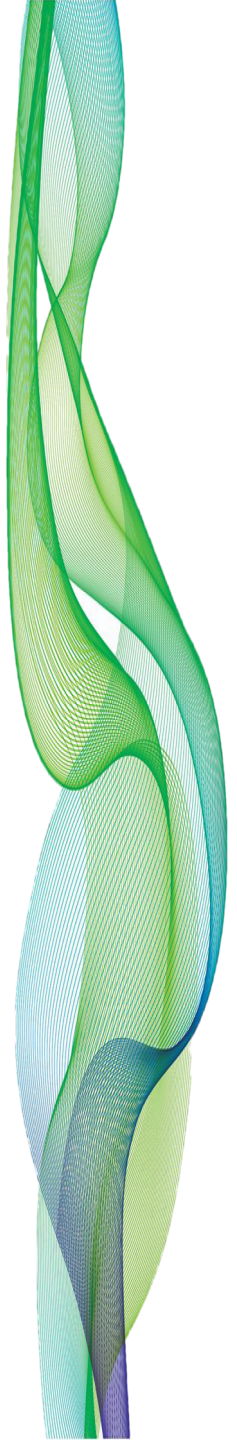


Libyan output remains highly volatile against a very fragile political situation, it is increasingly doubtful that elections will be held by the end of 2018.

Libyan supply disruptions, Jun 13 – Jun 18



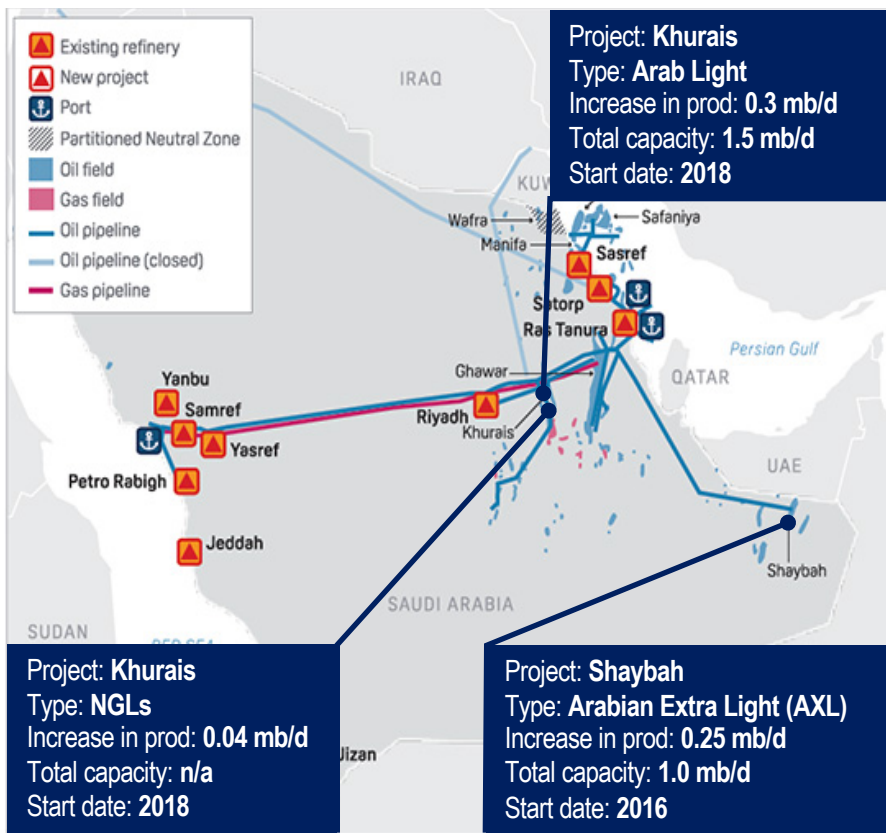
In early-2018 Libyan production outages were at some of their lowest point. Renewed unrest in June resulted in the biggest m/m decline since 2015, underscoring the fragility of Libya's situation.





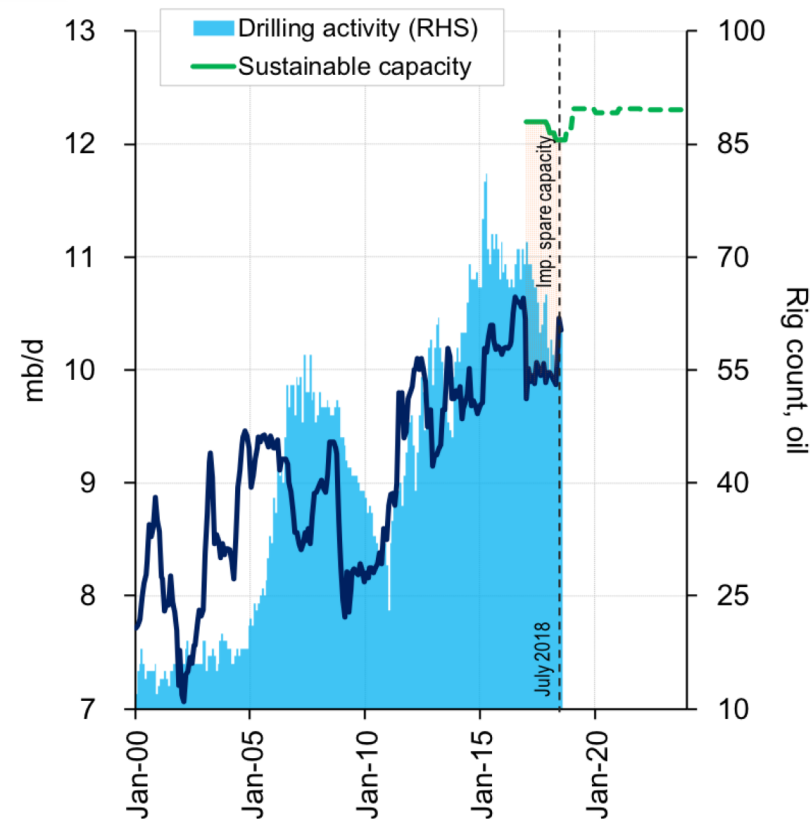
# Saudi Arabia's spare capacity into focus

## Saudi Arabia's oil upstream projects



The production target of 12.5 mb/d has never been tested and the market is doubtful whether Saudi Arabia's output can reach those levels.

## Saudi Arabia's production profile, Jan 00 – Dec 23E



Increasing production will need additional capital expenditure and ramping up drilling effort. But as Saudi Arabia increases its production, the market will still be concerned about available spare capacity.





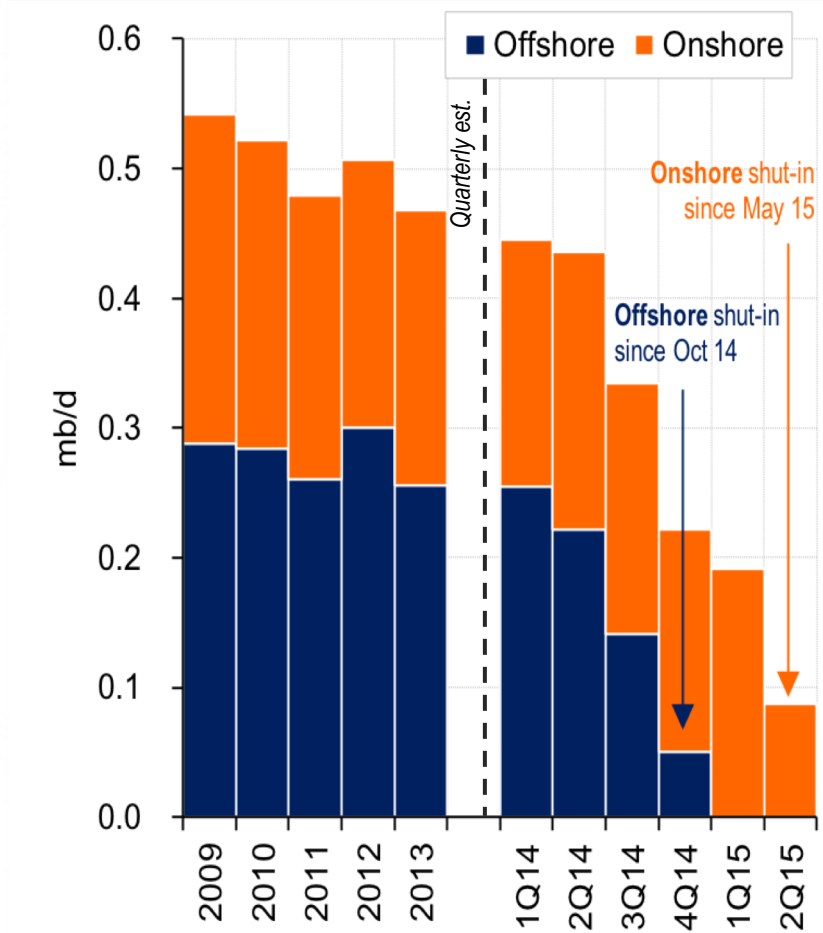
# The Neutral Zone

## Upside potential is possible but still long-delays

- Before the Neutral Zone (NZ) was shut-in in 2014-2015, oil production had fallen to below 0.5 mb/d though capacity remained close to 0.6 mb/d.
- Despite the speculation that oil production from the NZ would be brought back soon, full production is unlikely to start before 2019.
- Bringing back production would add to Arab Heavy volumes and crude exports, but not until the 0.4 mb/d Jazan refinery comes on stream in late-2019.
- Assuming an end-2019 restart of production from the NZ, IEA projects Saudi Arabia's sustainable capacity will increase by 0.2 mb/d to 12.3 mb/d in 2019, with this level sustained towards 2023.



Neutral zone crude oil production



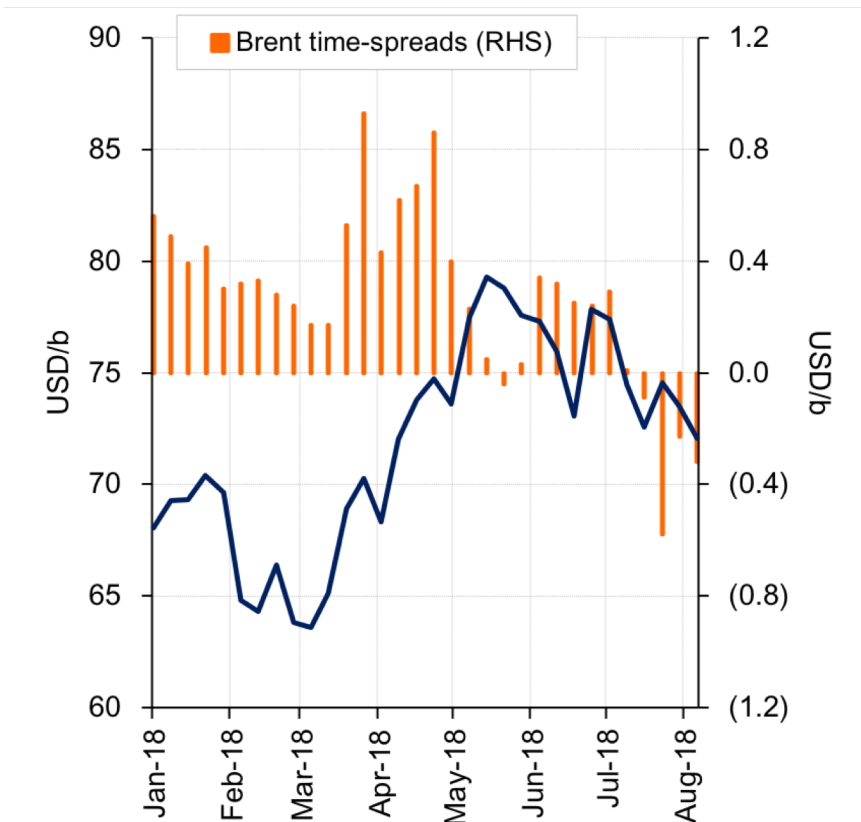


## Short- versus long-term expectations



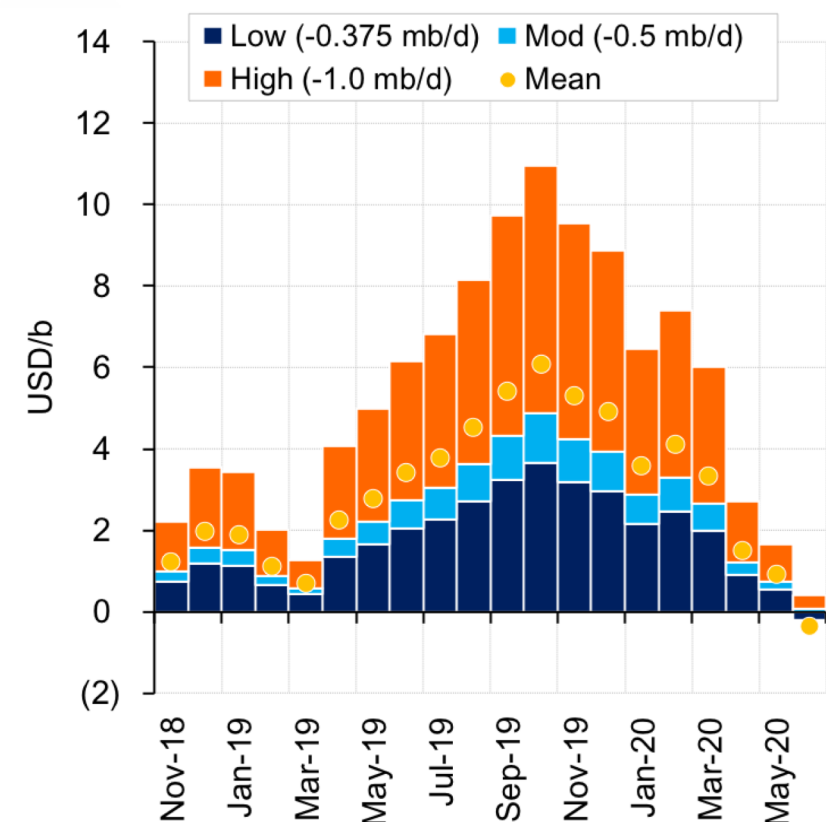
# Divergent expectations

ICE Brent price and time spreads, Jan 18 – Aug 18

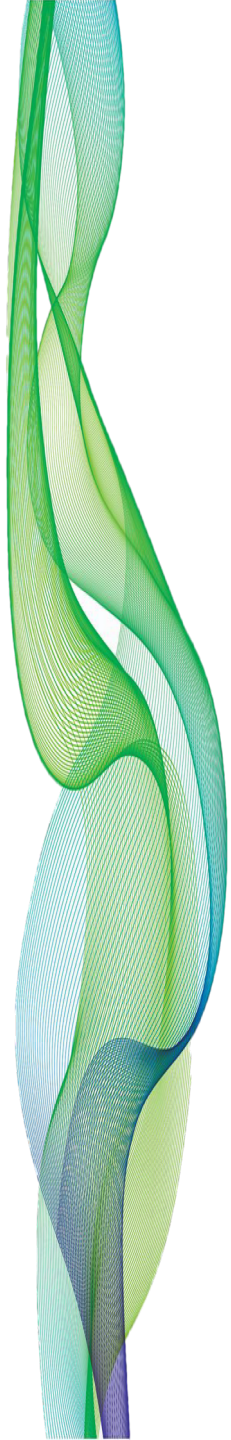


The price level and the time spreads are sending diverging and mixed signals but this is about to change.

Projected price impact of the Iranian losses under alternative scenarios, Nov 18 – Jun 20E



The market is expecting large output losses from Iran and prices to increase sharply from here.





# Balance of risks to the oil price outlook

## Broadly balanced, but risks mostly confined in 2019

**Upside risks can mark up prices to new highs in 2019, over \$90/b.**

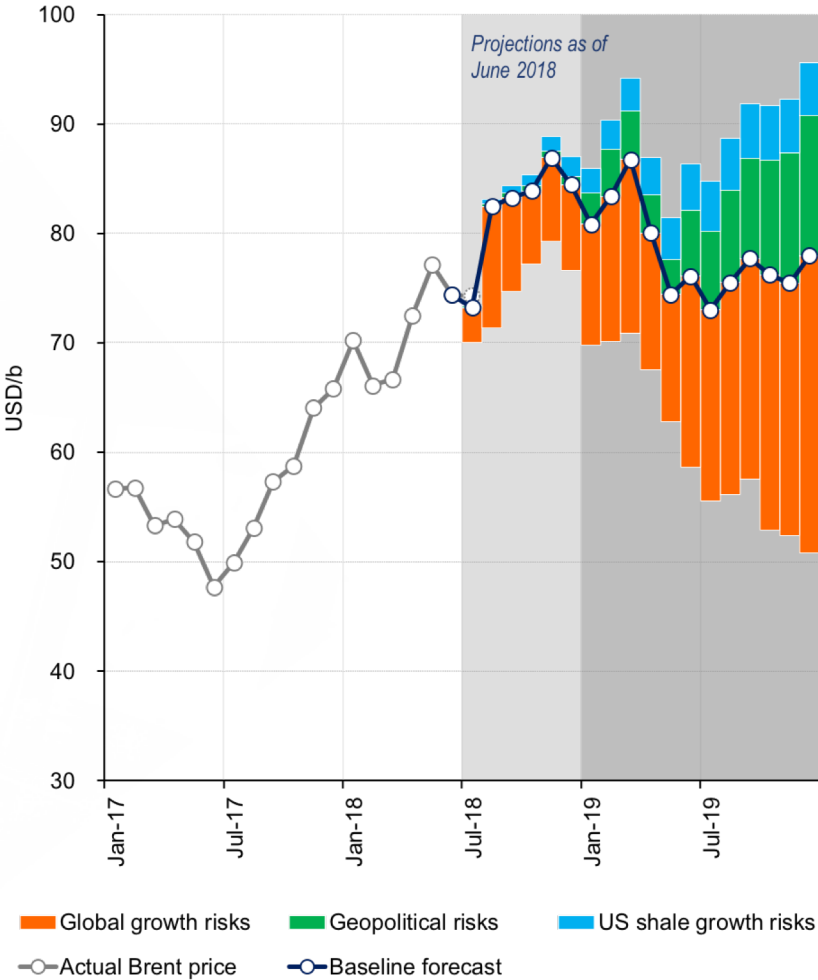
- ↑ The size of Iran’s supply losses.
- ↑ Venezuela’s output declines.
- ↑ Volatility of Libyan output.
- ↑ Infrastructure constraints impacting Permian supply growth.

**Downside risks can suppress prices towards the low-\$50/b anew.**

- ↓ Impact of trade wars on the global economy.
- ↓ Concerns about health of emerging economies.
- ↓ The impact of higher oil prices on demand.
- ↓ Saudi Arabia’s response (willingness and ability).

Balance of Risks	2018		2019	
Price outcomes (USD/b)	Annual AVG	Change from BASE	Annual AVG	Change from BASE
US shale growth risks	76.1	+2.8	82.2	+7.7
Geopolitical risks	77.0	+3.6	85.1	+10.6
Global growth risks	72.0	(1.4)	60.4	(13.9)

## Balance of risks to the baseline forecast, Jan 17 – Dec 19E





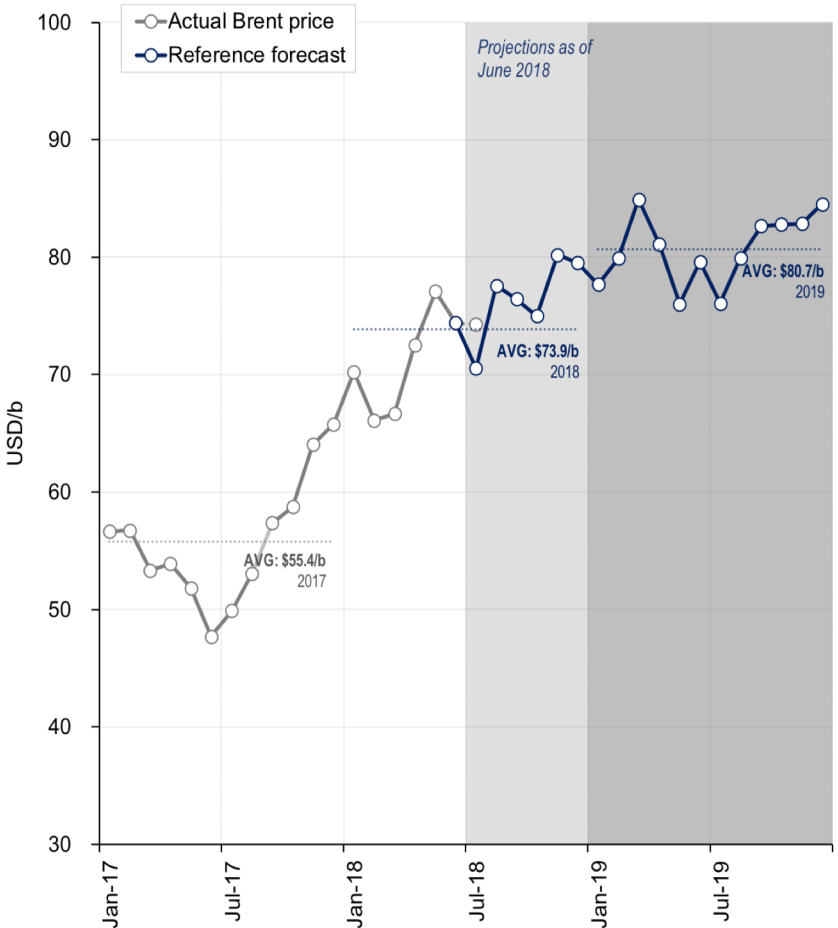


# Reference oil price scenario for 2018 and 2019

Prices are expected to gain both in 2018 and 2019, but hike eases

Reference assumptions		2018		2019	
<b>OPEC+ output adj.</b> (as of July 18)		+0.67 mb/d (100% target compliance)		n/a	
<b>Global economic growth</b>		+ 3.9%		+3.8%	
<b>Geopolitical disruptions</b>		-1.55 mb/d		-0.25 mb/d	
Of which:	Iran	Cumulative loss of -0.9 mb/d			
	Venezuela	- 0.65 mb/d yr-end		-0.25 mb/d yr-end	
<b>US shale output growth</b>		+1.4 mb/d yr-end		+1.1 mb/d yr-end	
		<i>Price outcomes (USD/b)</i>			
		2018		2019	
		AVG	Q/Q chg.	AVG	Q/Q chg.
1 <sup>st</sup> Quarter		67.7	4.8	80.8	2.6
2 <sup>nd</sup> Quarter		74.7	7.0	78.9	(1.9)
3 <sup>rd</sup> Quarter		74.8	0.2	79.6	0.6
4th Quarter		78.2	3.4	83.4	3.8
Annual AVG		73.9	18.1	80.7	6.8

Reference forecast as of June 2018, Jan 17 – Dec 19E





# The shift in the forward curve

## Potential explanations shaping price expectations

- Has the narrative of “lower-for-longer” oil prices amid views of US shale oil as the marginal source of supply been broken?
- Is there a realisation that investment in long-term capital intensive and more expensive upstream projects is needed and therefore the back-end of the curve will need to rise further to incentivise new investments?
- Without expectations relating to the Iranian disruptions, would the curve have shifted upwards?
- Is this increase only temporary, being driven by geopolitical outages and current uncertainties about supply losses?

Answering these questions sheds light on the current formation of expectations, as well as underscores the thin balance between bullish and bearish sentiment overwhelming recent market dynamics.

## ICE Brent forward curve as of 24<sup>th</sup> of August 2018



● ● ● Current    ● ● ● A month ago    ● ● ● A year ago

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Andreas Economou, Senior Research Fellow OIES

September 2018



Oxford Institute for Energy Studies

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