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SITUATION IN THE OIL MARKET

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Higher School of Economics
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Who is IICEC?

The Istanbul International Center for Energy and Climate (IICEC) is an independent Center at Sabancı University that produces energy policy research and has convening power at the energy crossroad of the world.

IICEC MEMBERS

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- **IICEC aims to inform policymakers, industry, academics and opinion leaders on key energy challenges and provide them with objective and genuine analysis.**
- **IICEC fosters the exchange and development of ideas by providing a distinguished platform gathering key stakeholders involved in energy and climate fields.**
- **The decision to form IICEC was motivated by the growing role of Turkey in the international energy landscape and the strategic position of Istanbul, where Europe and Asia meets.**
- **Utilizing this strategic position, IICEC serves to fill the need for an international approach with international resources to the future of energy and climate topics, as a globally recognized networking center.**

2018

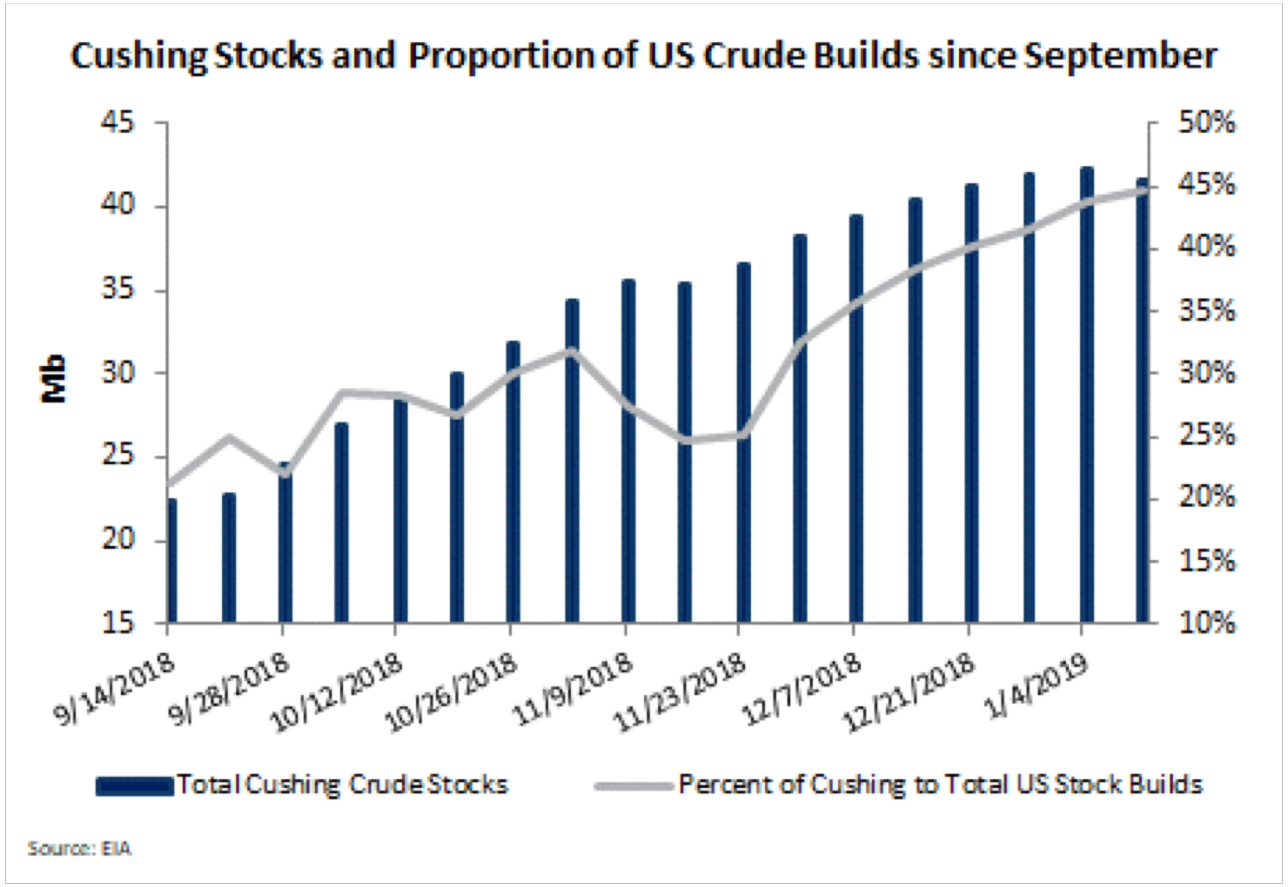
Strong Start to 2018

- At the beginning of 2018, the world oil market had finally achieved balance (the growth of world oil demand and supply were approximately equal).
- During 2018 prices continued to firm up with renewed confidence that the OPEC+ Producer Group could manage supply despite U.S. frackers.
- There were expectations that the U.S. would limit Iranian sanctions waivers.
- However, U.S. oil production increased by 1.6 Mb/d.
- By early October, despite a growing imbalance of world oil supply growth over world oil demand growth, Brent reached $85/b, but then quickly slid to less than $60/b in less than two months.
- What happened to the bullish market sentiment that prevailed in September?

What Happened in October 2018?

- Warning signs were appearing in September when Cushing stocks were rapidly growing to erase the 20 Mb reduction (from 60 Mb) achieved in 2017.
- Traders exited their long positions for profit taking.
- At the same time, world financial volatility began to set in.
  - Poor economic data from China and Europe
  - Inversion of the U.S. Treasuries yield curve.
  - Concerns over the U.S.-China Trade War.
  - October U.S. equities slide.
  - Fears of a hard-landing Brexit
- Combined with rising inventories & record Saudi production Brent began to plummet. The 2 November Iranian sanctions waivers added to the slide.

US Crude Inventories Added Price Pressure



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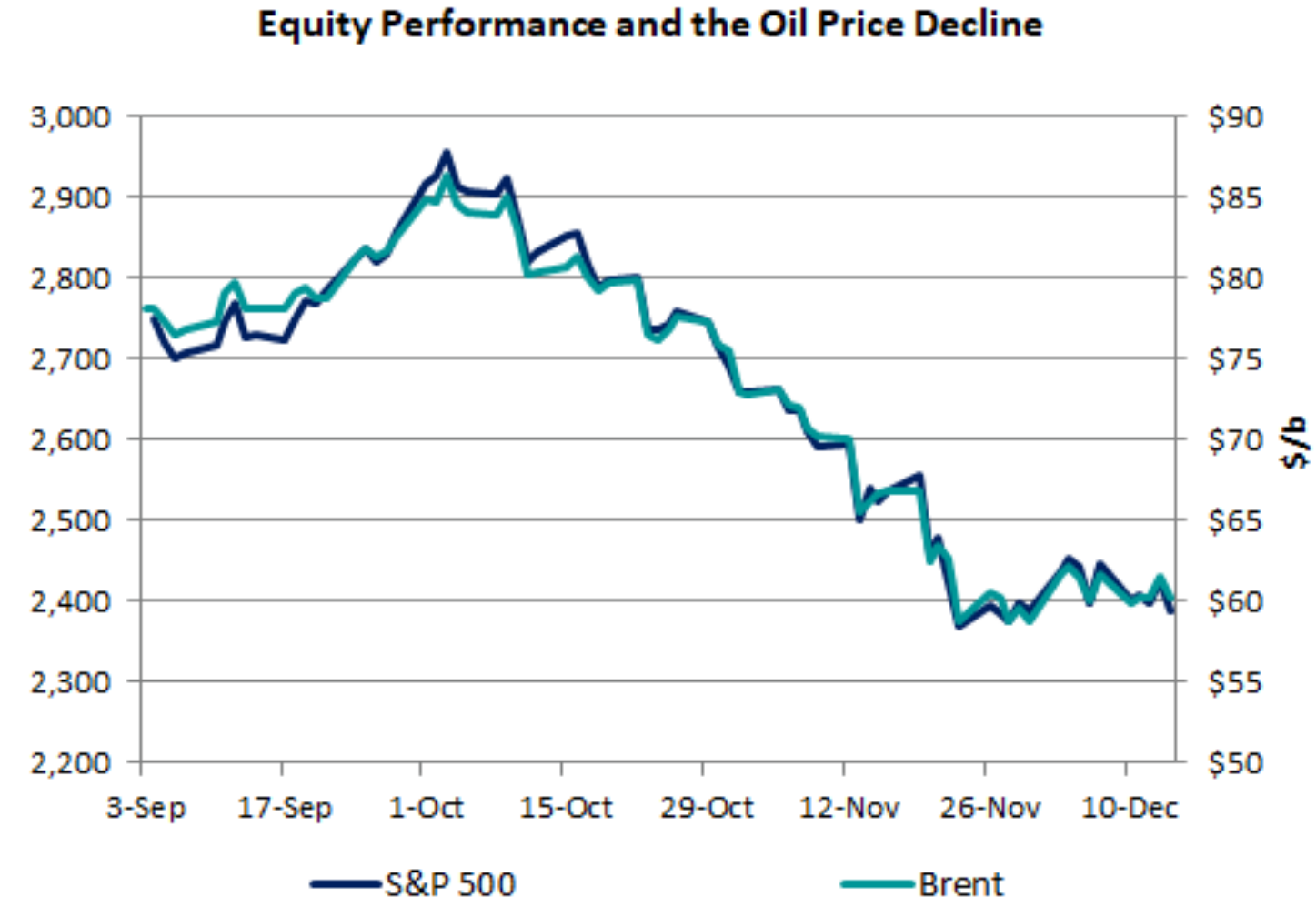
Equities and World Oil Prices



Source: Yahoo Finance

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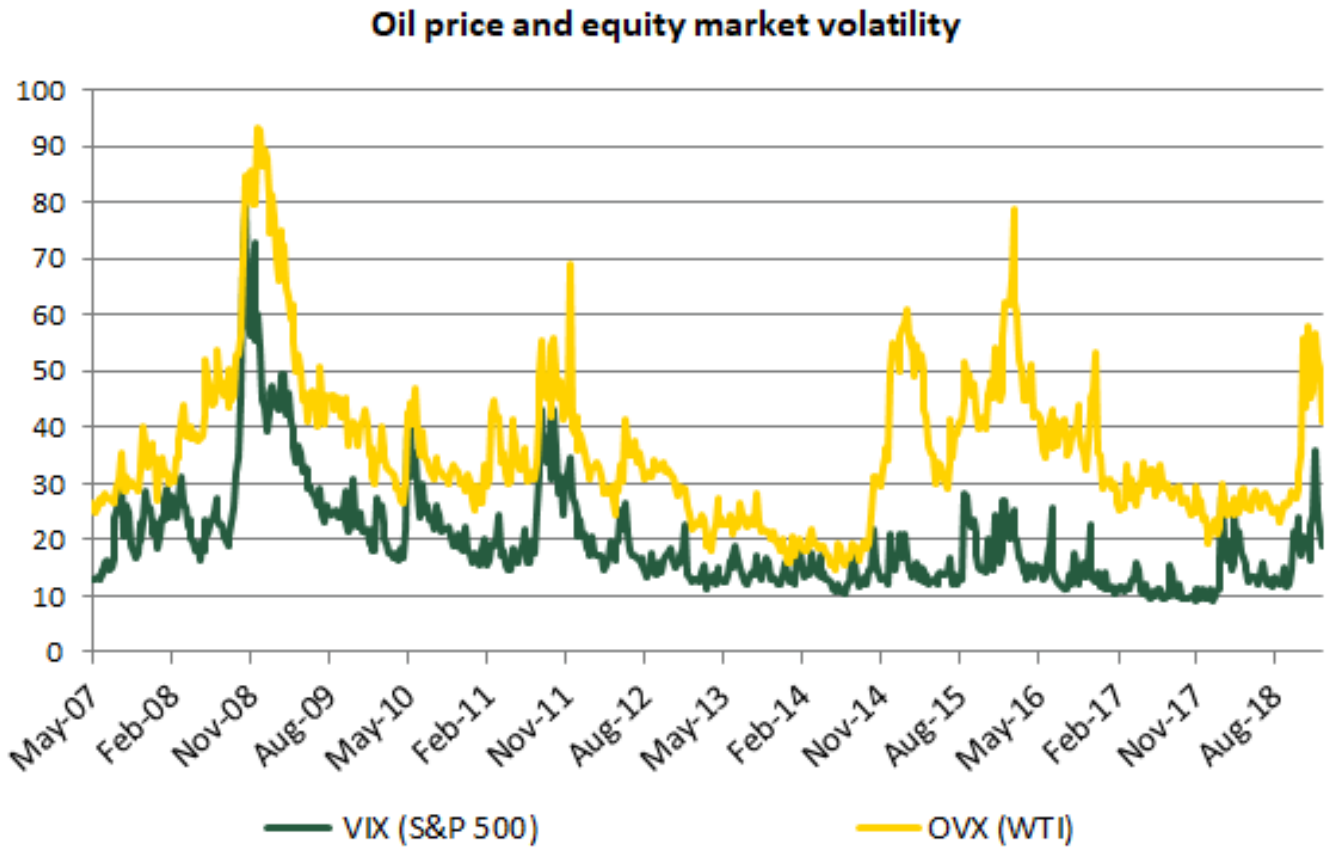
Equity and Oil Market Volatility Over the Longer Term



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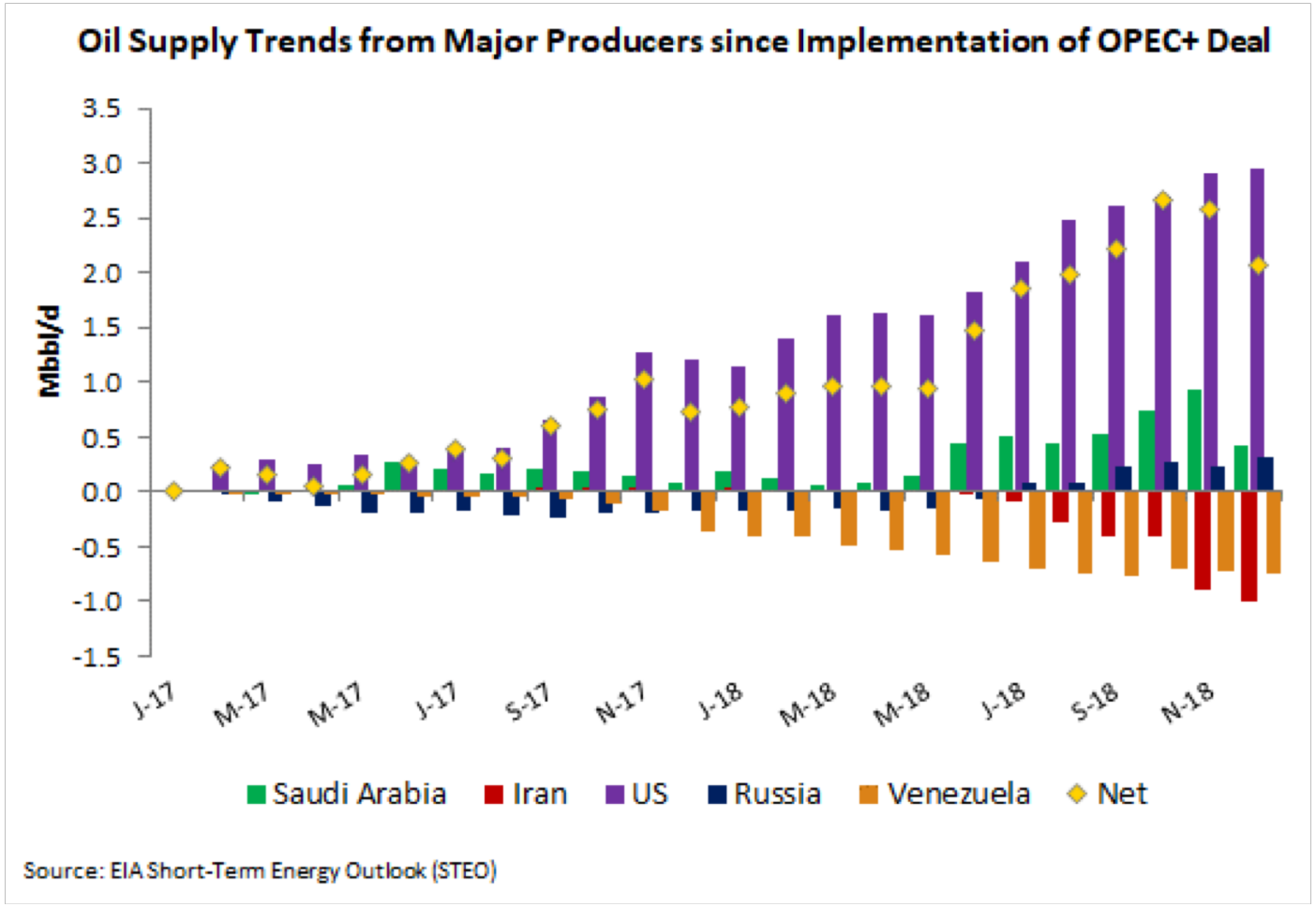
OPEC+ Deal Helped Restart US Growth



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Since the Collapse

- The pledge by the OPEC+ Producer Group to cut 1.2 Mn/d from October levels, did not firm up prices. Why?
  - Fuzzy details.
  - Traders expect less than 1 Mb/d in cuts.
  - The expected 0.7 Mb/d cut still produces a 1 Mb/d global surplus in this quarter (19Q1) leading to continued stock builds.
- Agency projections of the Call on OPEC have been declining.
- U.S. supply growth continued to surpass expectations until, recently, expectations have been raised to new levels.
- The volatile events that led to a dynamic 2018 oil price environment sets of the stage for continued volatility in 2019.

2019

2019 Price Expectations

- Two countervailing forces may roughly cancel each other out:
  1. Uncertainty about supply outages (Iran and Venezuela in particular)
  2. A weak economy and rising non-OPEC supply.
- Agencies show stock draws but higher than assumed U.S. production may result in a stock build over 2019.
- Prices may average $70/b in 2nd quarter but, by the 2nd half, remain below $70/b partly in response to U.S. pressure for Saudi Arabia to keep output high enough to stay within the "U.S./Saudi" compromise price zone.
- U.S. production will benefit from the reduction of transport bottlenecks that will cut the WTI price discount relative to Brent by about half.
- Upside and downside risks are significant, so the the 2019 market may be volatile.

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Declining Call on OPEC

2019 Call on OPEC and Implied Global Supply Surplus (Mb/d)				
	Rapidan	IEA	EIA	OPEC
February Forecast	29.6	30.7	30.3	30.6
March Forecast	29.6	30.6	30.4	30.5
M/M Revision	-0.1	-0.1	0.1	-0.1
Implied Surplus	1.0	0.0	0.2	0.1

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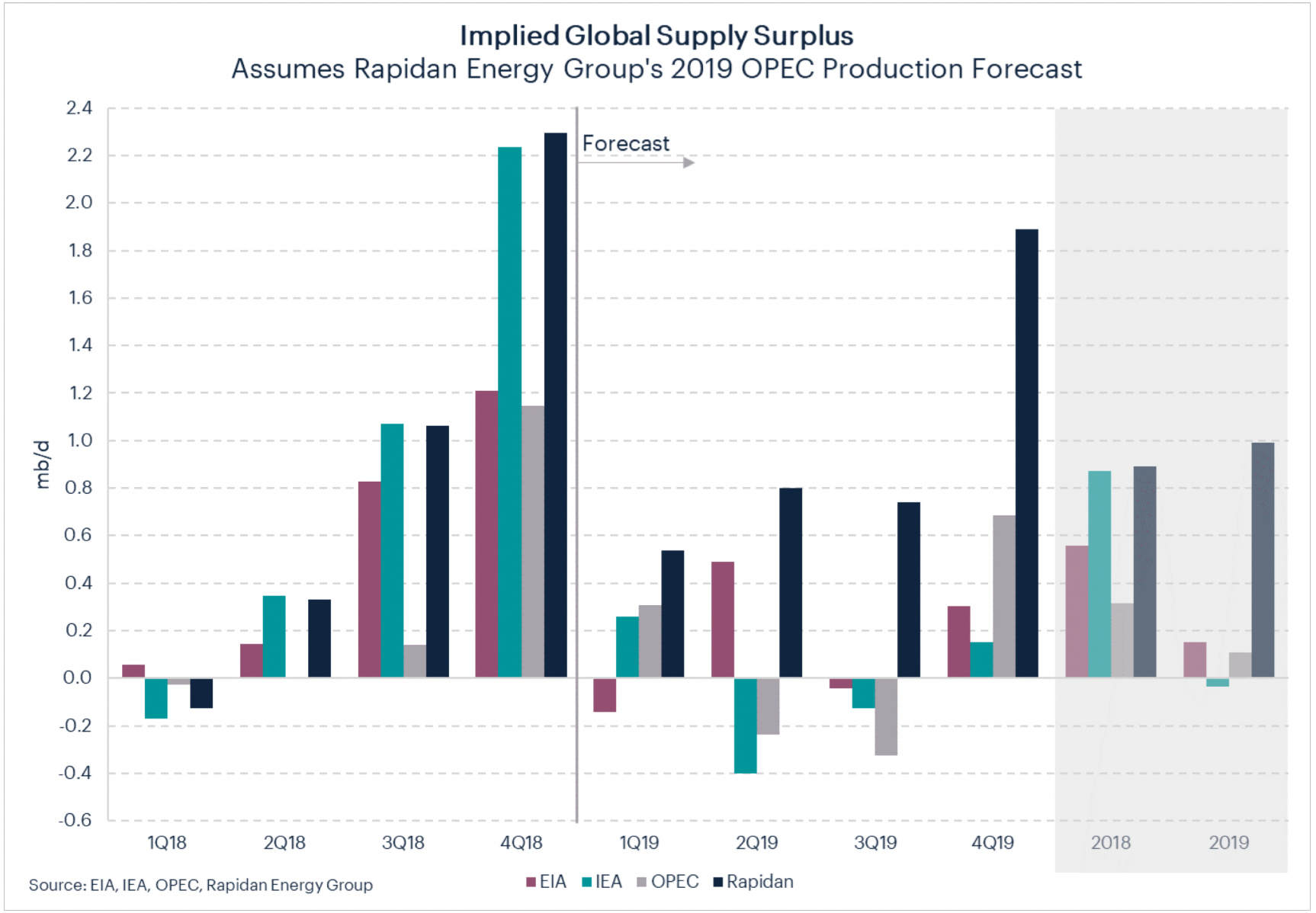
Global Supply Surplus

(Accounting for China)

China aiming for storing 90 to 150 days of crude imports. This should be added to OECD changes to fully estimate world stock builds.

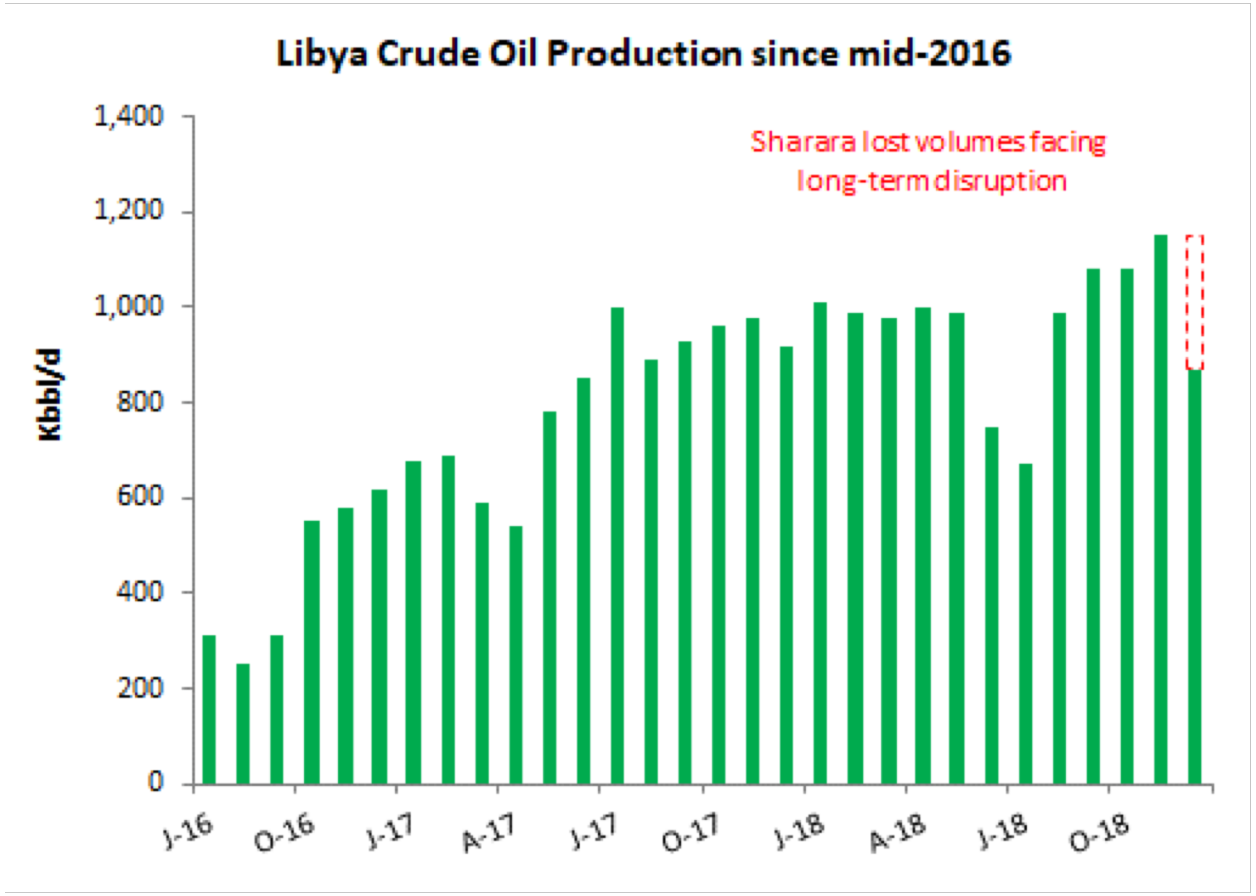
Source: Rapidan Energy Group



Country Expectations

- Iran: Exports of 1.3 to 1.5 Mb/d through April. Afterwards, sanctions pressure might increase, reducing exports. However, reports that U.S. pressure would ”zero-out” Iranian exports are not realistic.
- Venezuela: Continued declines in production to 0.7 Mb/d by year’s end. Could be much worse or much better depending on the resolution of the political crisis.
- Iraq: Expect 4.9 Mb/d (higher than 4.65 Mb/d OPEC target).
- Nigeria: Production to remain at 1.7 Mb/d with no major outages. Recent Buhari victory generally regarded as a stabilizing factor by markets and problems with Delta militias likely to be avoided.
- Libya: Production increasing to 1.1 Mb/d in 2019 (mid-April National Conference may advance national reconciliation).

Nonetheless, Libya Disruption Risk Remains



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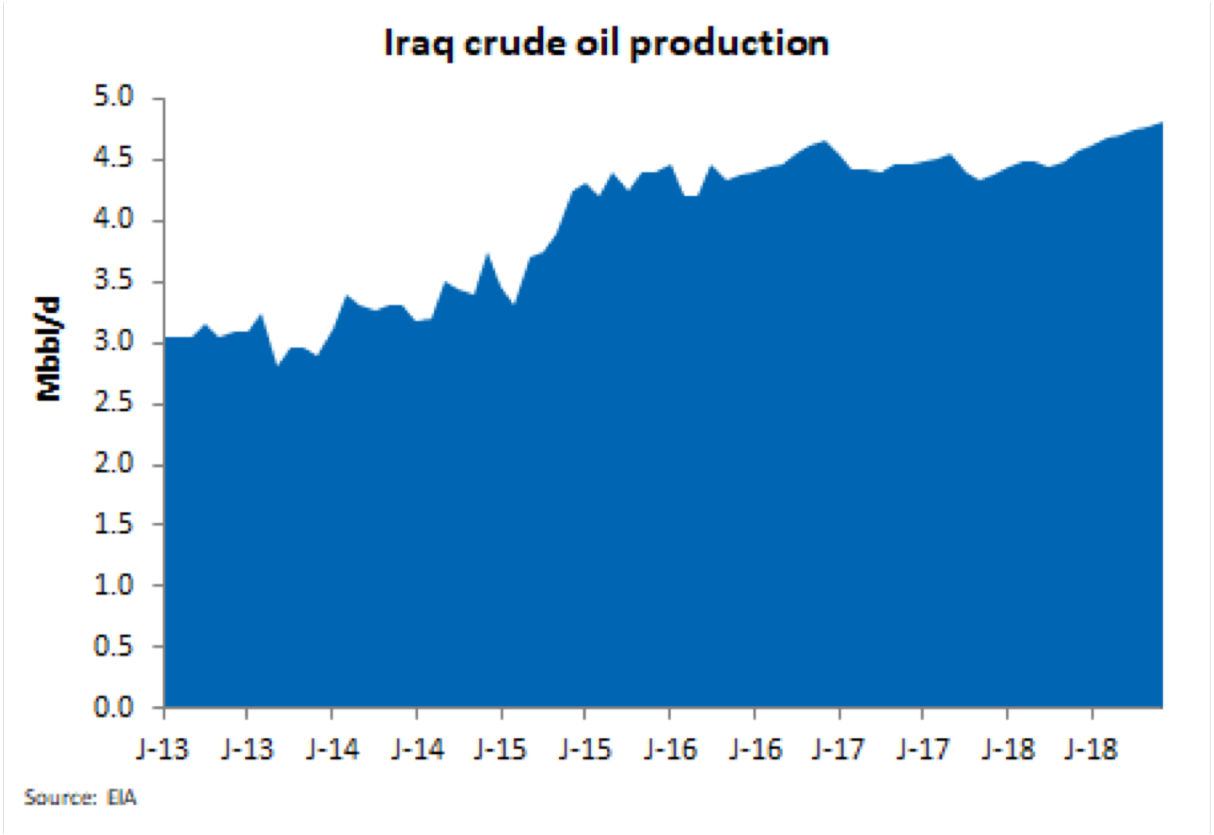
Iraq Hits Record Highs with Upside



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Big Three Expectations

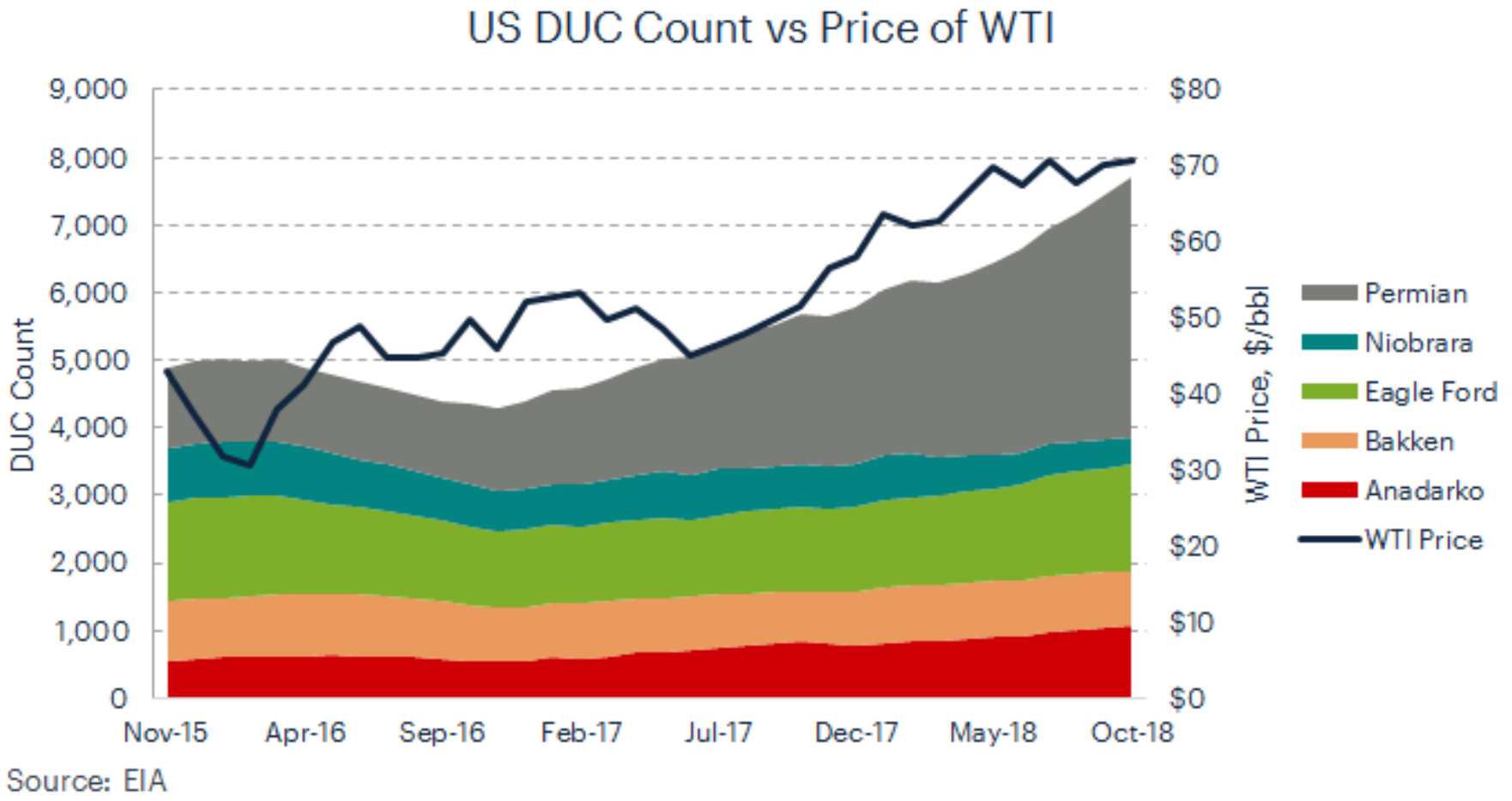
- Saudi Arabia: Announced March crude production of 9.8 Mb/d leading to a post 2014 low of 6.9 Mb/d exports. Previously-mentioned U.S. pressure to keep prices below $70 could change month to month output.
- Saudi cooperation may be complicated by Washington's NOPEC legislation (WILD CARD).
- Russia: Production to remain near 11.3 Mb/d perhaps reducing later in the year but I defer to my hosts on this.
- United States: U.S. growth is unusually dependent on oil prices (relatively high elasticity of supply). Nonetheless, even with $65/b Brent, oil production is expected to grow by at least 1.2 Mb/d in 2019.

Why the U.S. Increase?

- First, U.S. tight oil supply is price elastic in the short term (unlike other oil production technologies/sources).
- U.S. tight oil production responds quickly to investments so the cycle of investment to production is short.
- Conventional oil production takes much longer to respond to production, especially complex projects involving deep wells.
- This chart shows how U.S. production responded to the 2018 price increases.

Investment in U.S. Tight Oil Responded to Higher Oil Prices

(Showing as a proxy for investment the number of Drilled But Uncompleted oil wells, or DUCs)



Source: EIA

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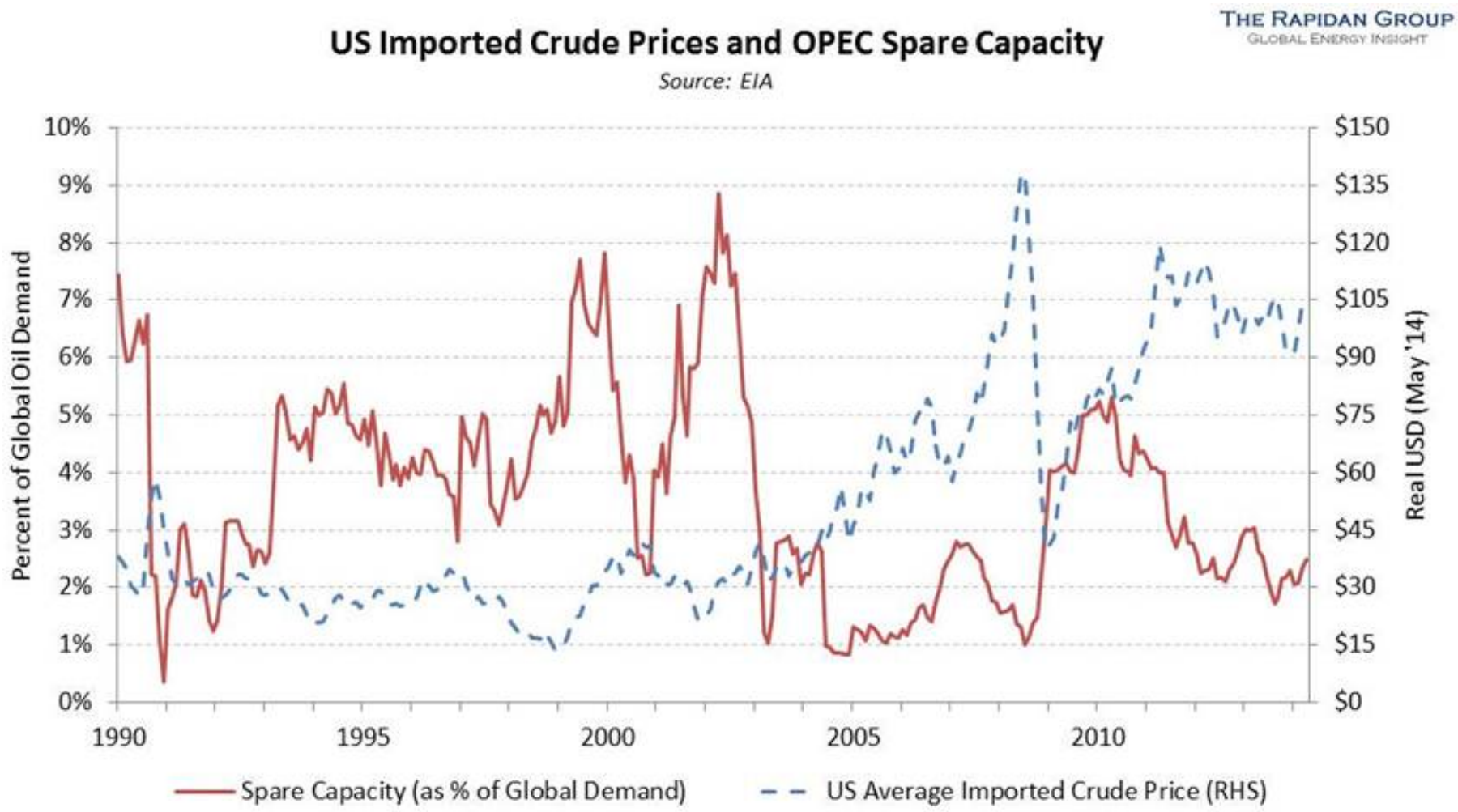
Why Would U.S. Oil Production Increase Over 1 Mb/d with $60/b to $70/b Oil?

- So why such a big jump in 2019 with a softer oil market?
- Pricing concessions by the oil field services industry will help maintain profitability.
- Capital availability and continued technology-driven efficiency gains will continue to support production.
- Unlocking bottlenecks: Increased pipeline offtake capacity to Gulf Coast refiners and export terminals should narrow the gap between WTI and Brent from $10/b to $5/b.

Wild Card: NOPEC

- A Committee in the U.S. House of Representatives has passed the “No Oil Producing and Exporting Cartel Act” also under consideration by a Senate Committee and generally having bipartisan support.
- Compared to past NOPEC bills, this one has stronger enforcement.
- Since sovereign countries have the clear right to manage their own resources, litigation would be lengthy and messy.
- In addition, the bills eliminate “foreign sovereign compulsion” as a defense so international oil companies could be sued as co-defendants.
- Suits would likely lead to legal retaliation but it is possible that the very spectacle might cause some OPEC Members to use NOPEC as an excuse to raise production.

OPEC Benefits



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Oil Volatility Hurts Economies

- Sharp declines in world economic growth is usually preceded by an oil price shock.
- Price-inelastic demand and supply cause oil price shocks.
- Oil price shocks reduce economic growth through dislocations of labor and capital.
- The counter cyclical movements of OPEC spare capacity, shown above, make clear that OPEC's behavior as a price regulator has made such shocks less likely or less severe.
- While OPEC has not provided as much price stability as the Rockefeller Cartel of the 19th century or the Texas Railroad Commission during much of the 20th century, what it has provided has been important.

2020-2025

Wild Card: IMO 2020 (Marine Sulfur Standard)

- IMO 2020 would require non-ECA marine fuel to go from 3.5% to 0.5% sulfur on 1 January, 2020 OR achieve equivalent SOx reduction through use of scrubbers or an alternative fuel such as LNG.
- The IMO has been adamant that there will be no delay in implementation.
- Current analysis (various sources) shows:
  - About 3-4 Mb/d of additional refining capacity needed to produce 0.5% product instead of 3.5%.
  - Increased refining intensity implies 0.5-1.0 Mb/d higher crude runs.
  - Increased use of high sulfur crude in the power sector.
  - Higher prices of low sulfur crude (e.g., U.S. tight oil).
  - Lower prices of high sulfur crude (e.g., Mexican, Venezuelan).

IMO 2020 Uncertainties

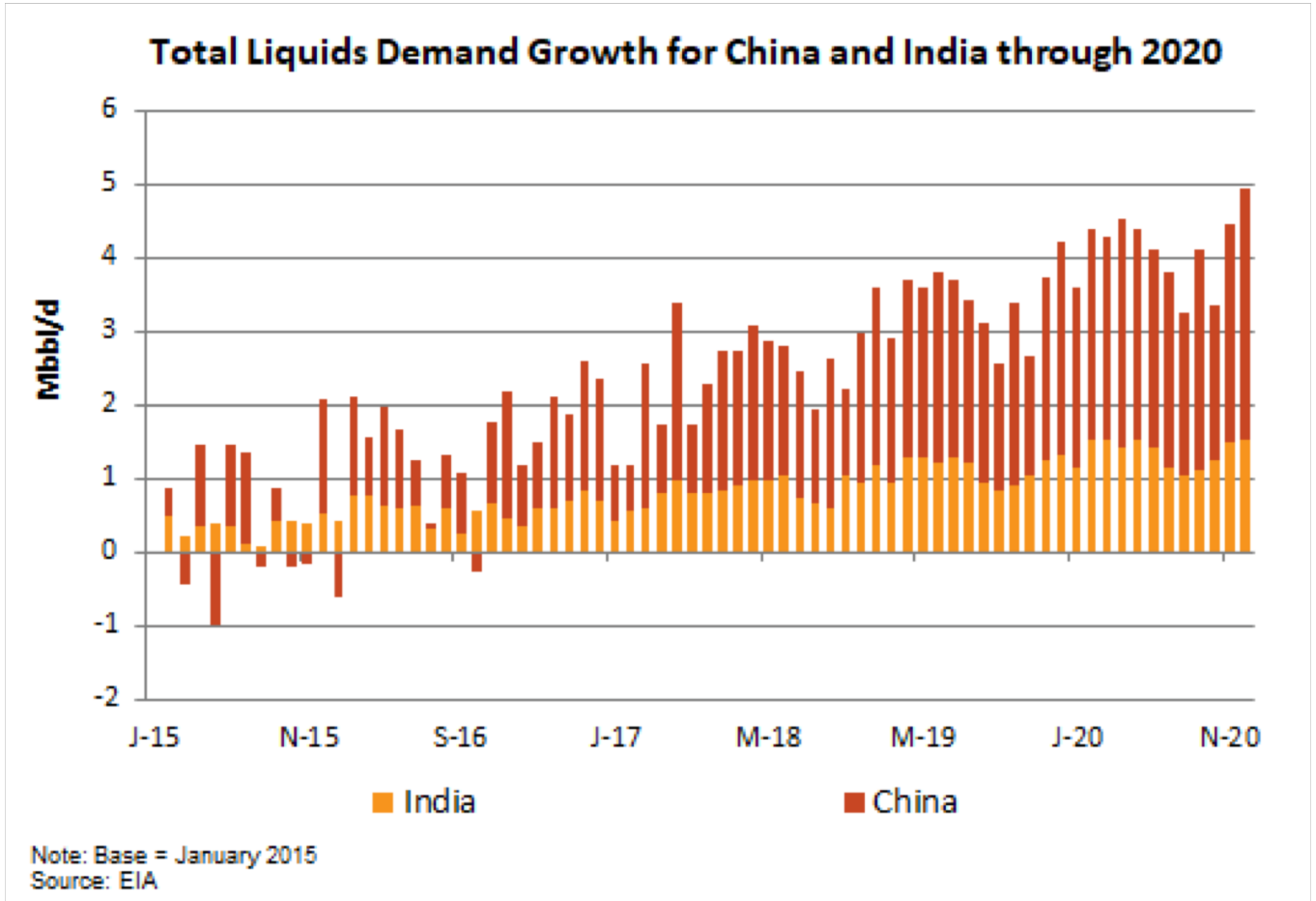
- Ongoing investments in refinery desulfurization capacities?
- How many new refineries will be on line at the beginning of 2020?
- Whether the assumed high utilization rates are realized in 2020?
- Whether marine traffic will increase?
- How much will marine engine efficiency increase?
- How many ships will use scrubbers to enable continued use of high sulfur fuel?

- Analysis of the expected increase in refinery product prices varies:
  - The IEA predicts a 20% to 100% increase in diesel fuel.
  - The U.S. EIA predicts only 6.5% increase.
  - Significantly, the recent U.S. Council of Economic Advisors report uses the IEA estimates.

IMO 2020 Consequences

- If the IEA/CEA is correct, IMO 2020 is implemented on 1 January 2020 and strictly enforced, then gasoline, jet, diesel and heating oil prices will all spike.
  - There will be a 'scramble' for sweet crude and oil prices will increase.
  - This would be similar to the mid-2000s pressure on oil prices as a result of refiners' inability to produce enough middle distillates (not enough cracking capacity at that time to process heavy crudes).
  - Sophisticated refiners will enjoy higher crack spreads while less capable refiners struggle.
  - If we see a 2020 product and oil price spike, a number of adjustments will be made and, over time, the market will return to normal.
  - Nonetheless, 2020 oil prices could remain elevated for an uncertain period of time.

Demand: China and India Will Continue to Drive Global Demand Growth



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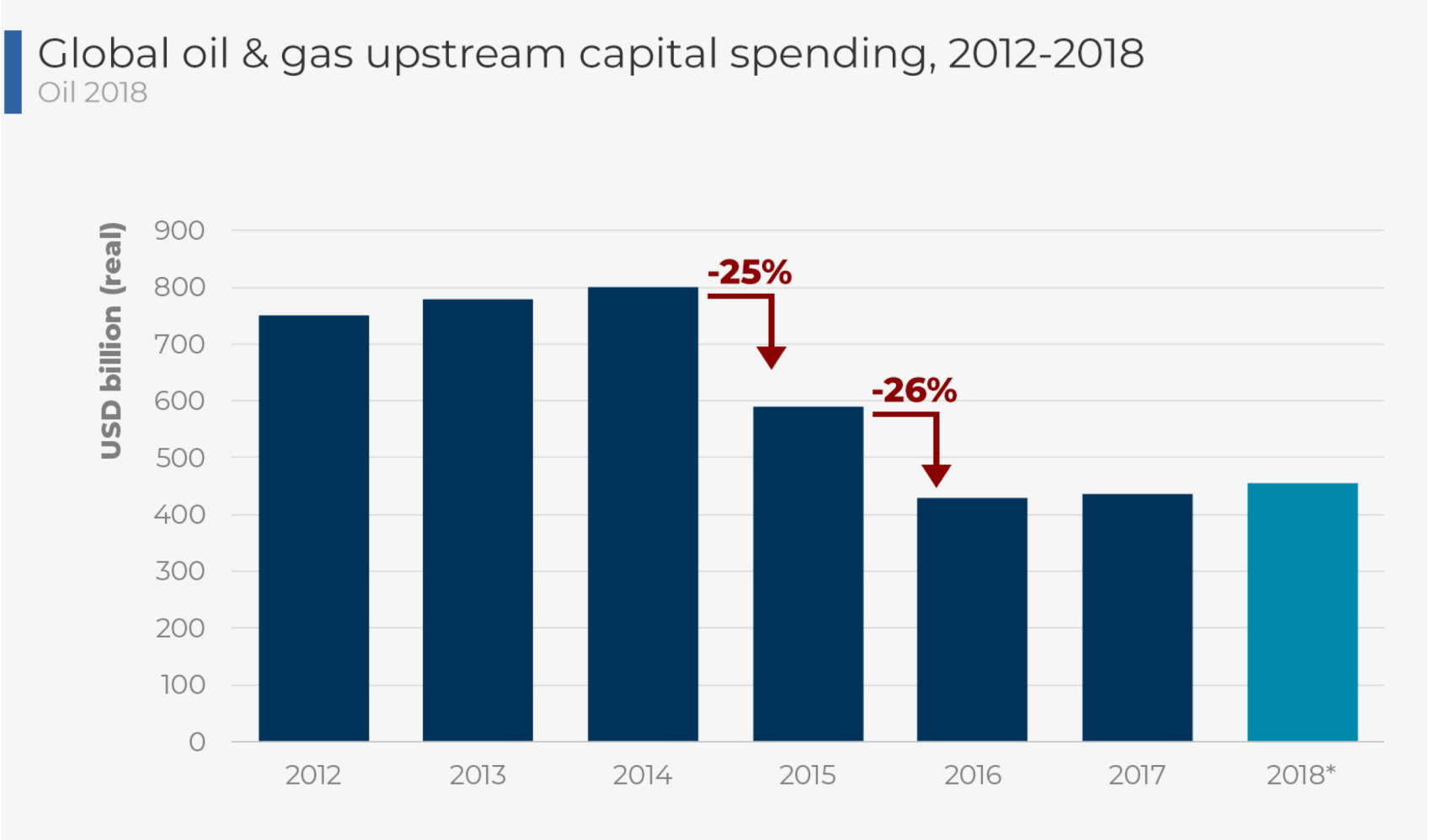
Supply: U.S. Tight Oil in the Mid Term

- The U.S. has a very elastic supply of tight oil as long as production exploits well-known, attractive plays.
- Eventually, however, frontier areas will have to be explored that will require higher prices (less elastic).
- In addition, there are signs that investors may require more profits to continue the virtually unlimited supply of capital U.S. producers have enjoyed.
- On top of that, higher interest rates could also dampen tight oil investments

Other Constraints on U.S. Tight Oil Growth

- **Evolution of the U.S. land-driller model:**
  - **Past growth of U.S. tight oil drive by reduced well cycle times overcoming the headwind of lower oil prices.**
  - **Up to now, land drillers have not received a significant share of well efficiency savings as increased day rates are well below daily production cost savings**
  - **As production ramps up, land drillers may acquire more negotiating power and increase their prices to acquire a larger share of well efficiency savings.**

Past Conventional Oil Supply Investments



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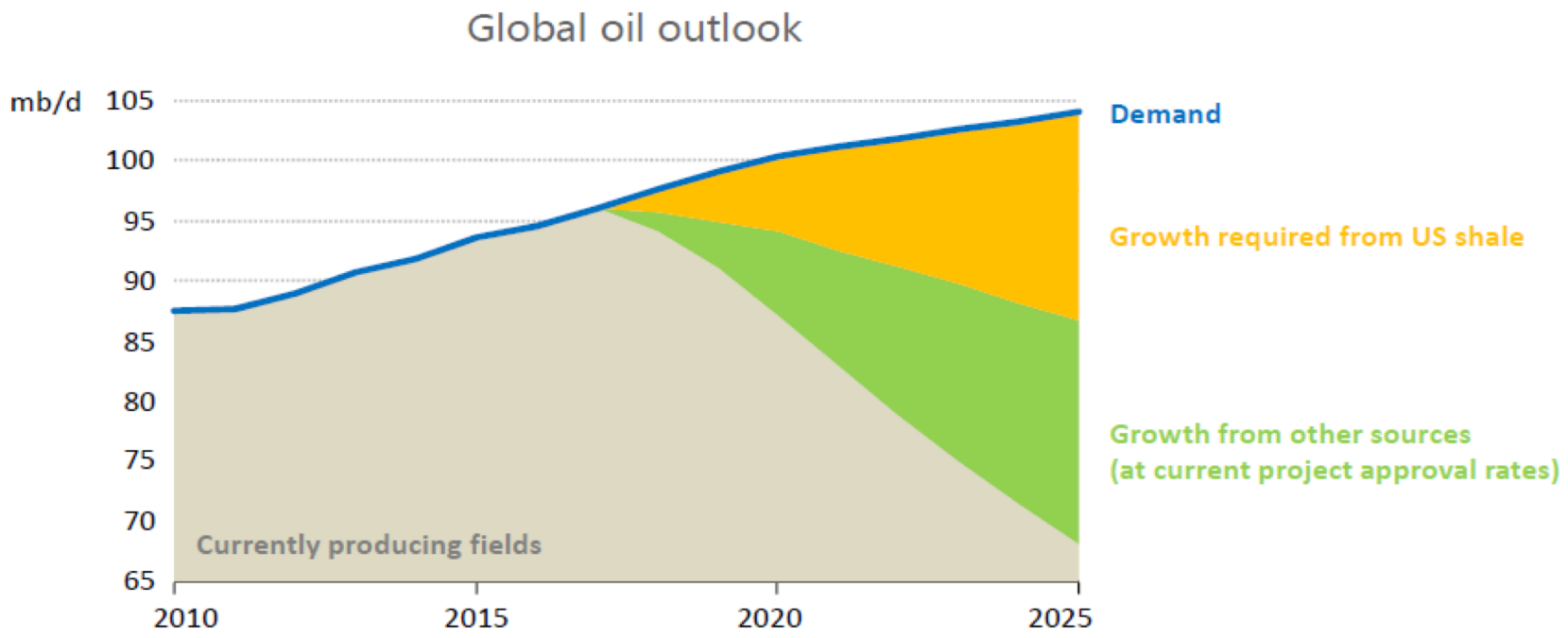
Consequences of Reduced Non-OPEC oil Investment Outside of the U.S.

- **The majors have deferred investment in complex oil projects.**
- **Production in existing major oil fields inevitably declines.**
- **Consequently, the fundamentals in a few years may look very different than they do now.**

Consider the
2018 IEA World Energy Outlook



Oil demand looks robust in the near term; if approvals of new conventional projects remain low, market stability would require continuous exceptional growth in US shale

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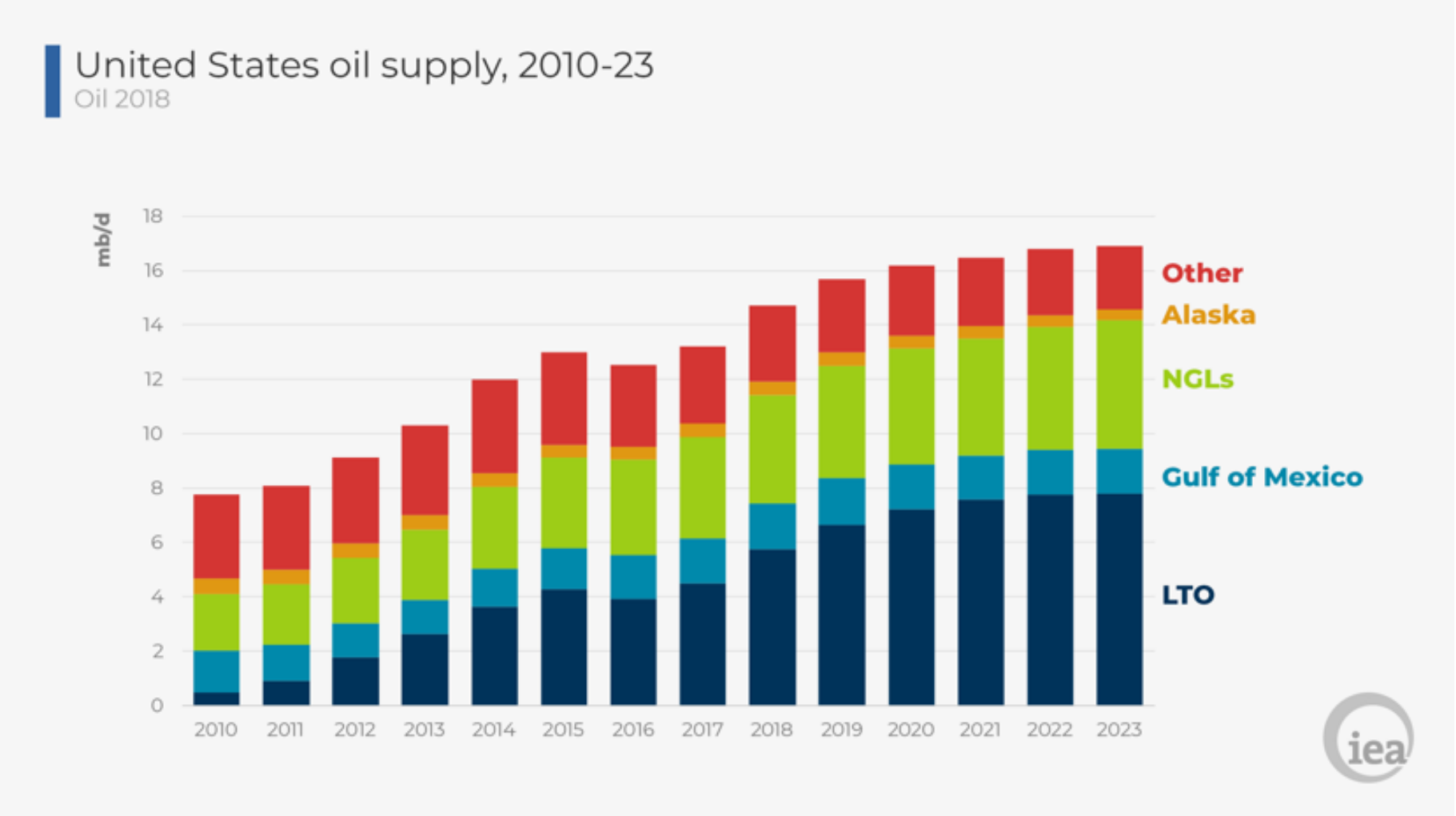
Is this IEA U.S. Tight Oil Wedge Realistic?

- The IEA says that, in order for the U.S. frackers to make up for conventional oil field declines and reduced non-OPEC investments after 2014, U.S. production would have to increase by an average of 1.6 Mb/d from 2020-2025 brining U.S. oil production to 21.7 Mb/d by 2025.
- Is this realistic? I've outlined some headwinds above to increasing U.S. tight oil production. Nonetheless, we've seen a significant reassessment of future U.S. tight oil supply growth.
- The IEA and U.S. DOE reference cases projections show U.S. oil supply almost covering this gap reflecting a sharp expected increase in U.S. tight oil production

IEA Projection of U.S. Oil Supply



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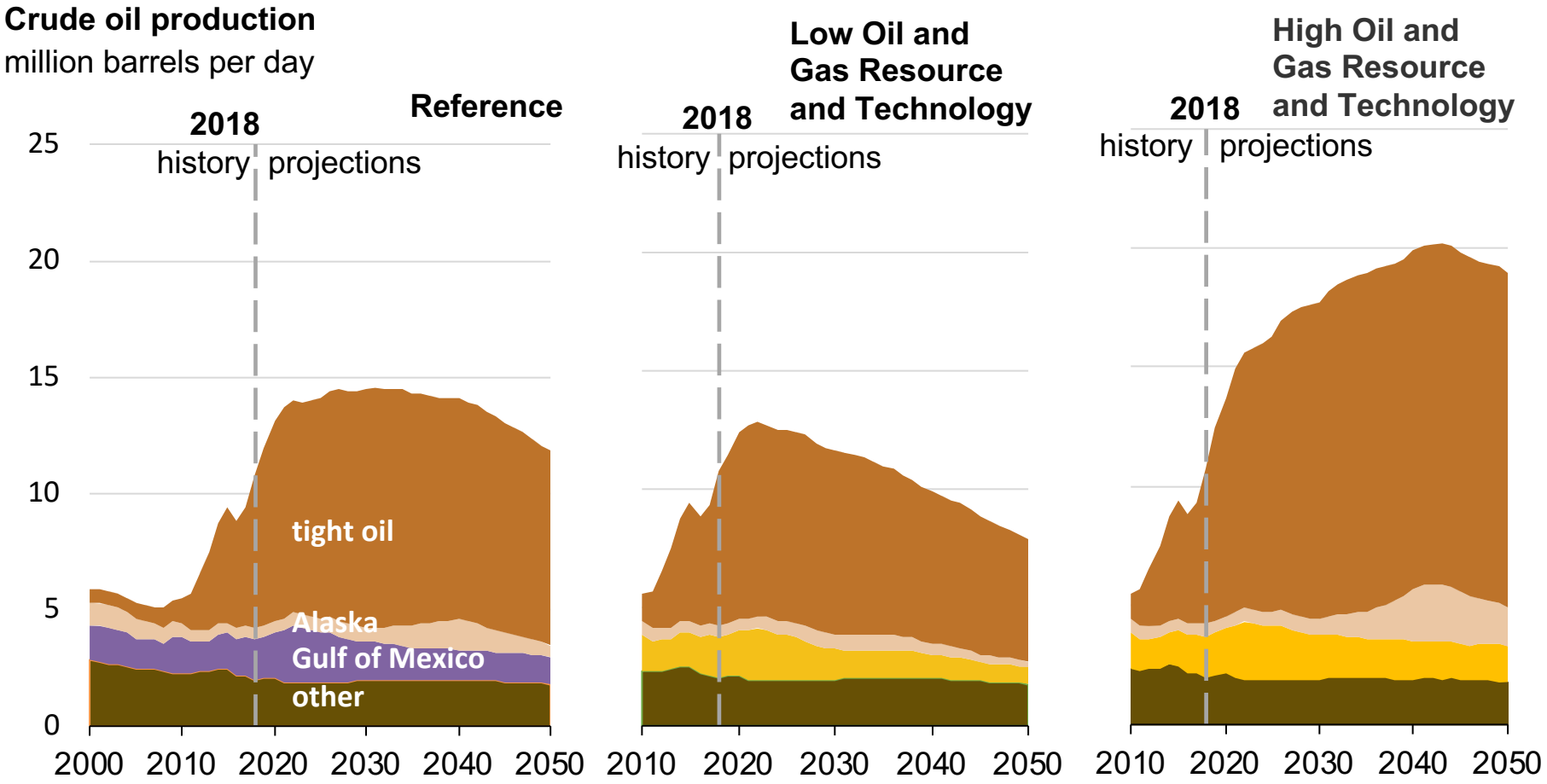
U.S. EIA Projection of U.S. Oil Supply (Excluding NGLs)



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With this Growth Mid-Term Oil Balance Looks to Be Much Better

- When it first became apparent that the “call on the United States” was going to be so large, the mid-term oil market pointed to a more brittle oil market that would be vulnerable to supply outages, price shocks and the economic recessions that follow them.
- The updated outlook for U.S. tight oil has significantly offset such concerns.

Some Messages for Consuming Countries

- Nonetheless, expectations cannot account for a variety of uncertainties .
- Countries should remain vigilant.
- It is important to continue efforts to reduce oil consumption and maintain or build strategic oil stocks.

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