

# OPEC, Trump and the Energy Outlook

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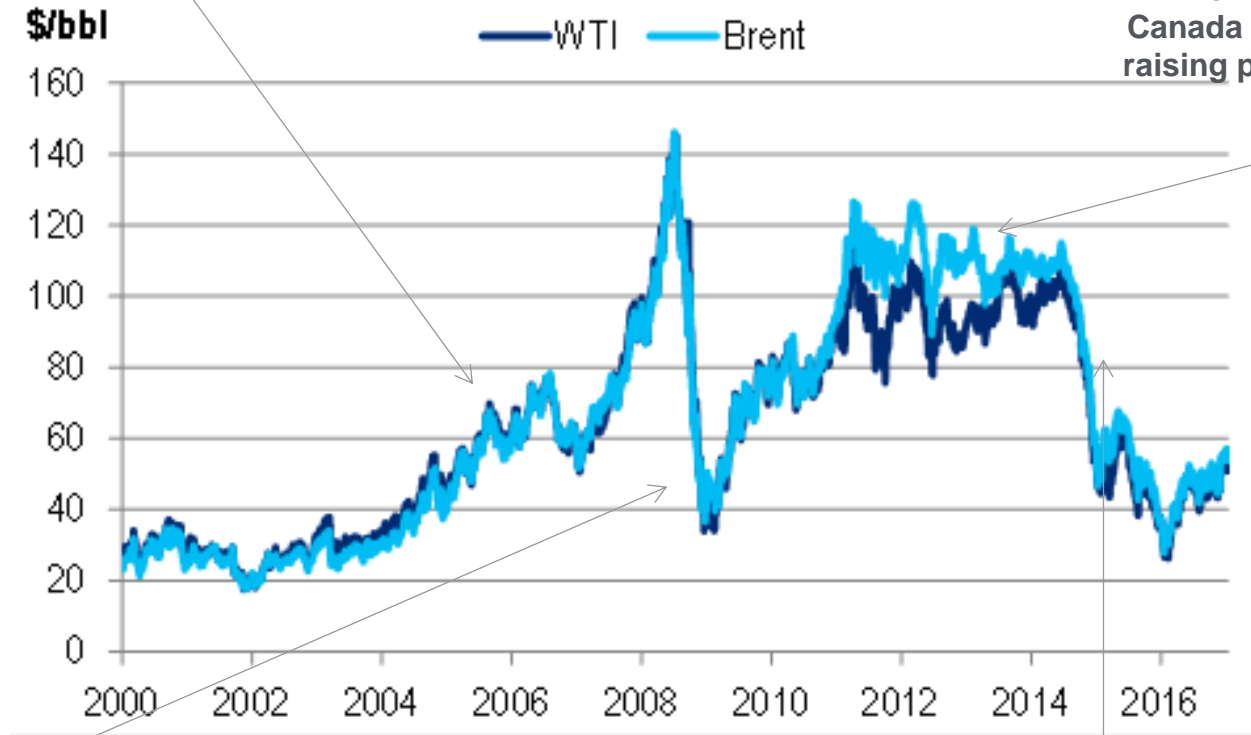
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# Only recent span of price stability saw underlying dynamic change

## Global Crude Oil Prices this Century to Date (\$/bbl)

The first 8 years saw price recovery followed by an explosion in prices

Then the 'Arab Spring' inspired supply disruptions, balanced by massive production growth from Brazil (deepwater), Canada (sands) and US (shale), raising prices but holding them steady

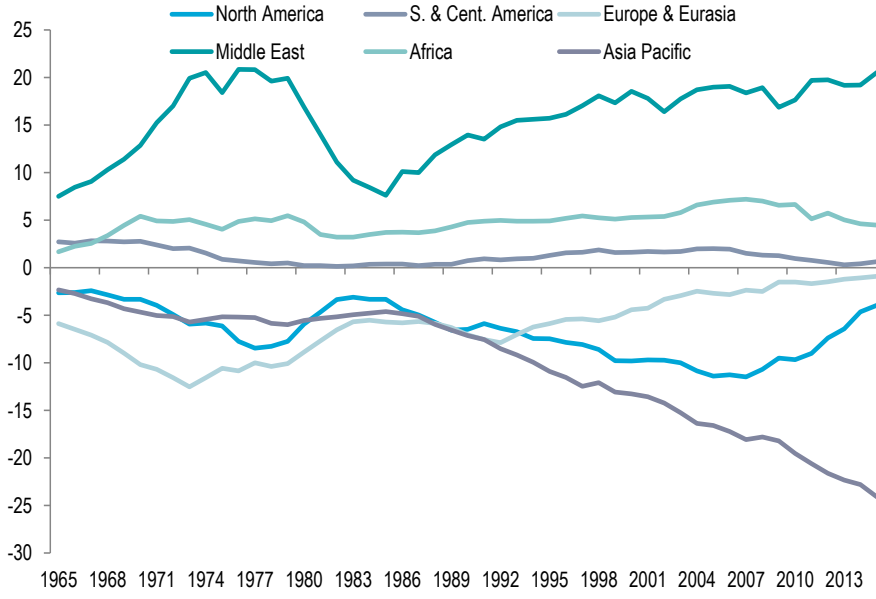


That was followed by a financial crisis and a slow recovery from mid-2008 to late 2010

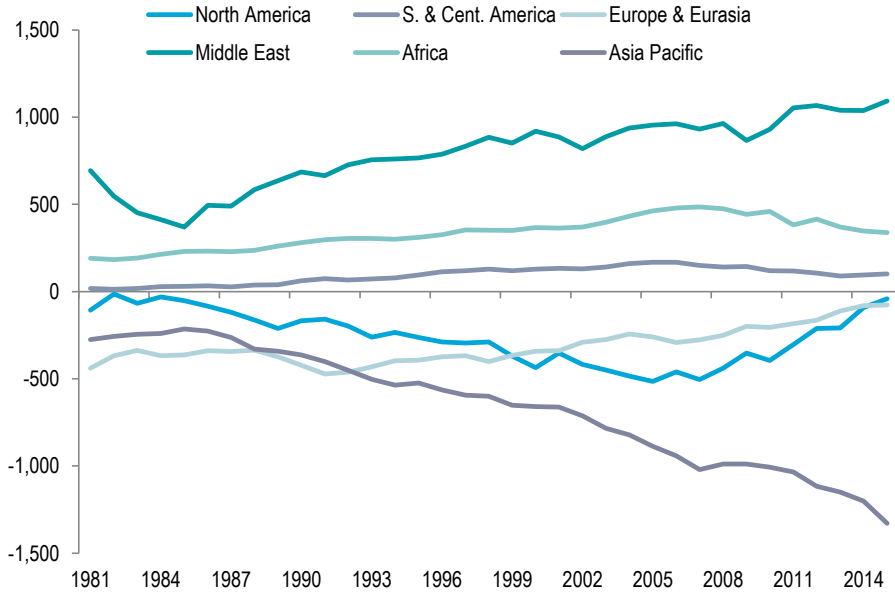
By early 2014, unconventional oil not only replaced disrupted oil but more than satisfied global demand growth

# Asia Is Now the Only Meaningful Energy Short Left

Global Oil Net Balance (m b/d)



Global Energy Net Balance (MTOE)

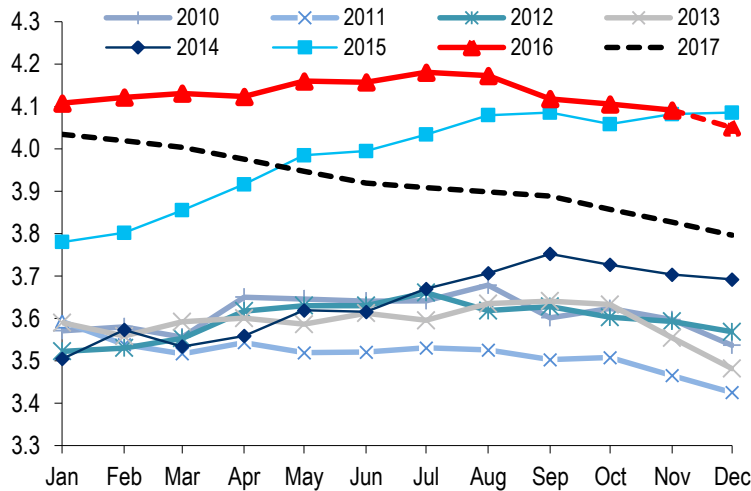


Source: BP, Citi Research

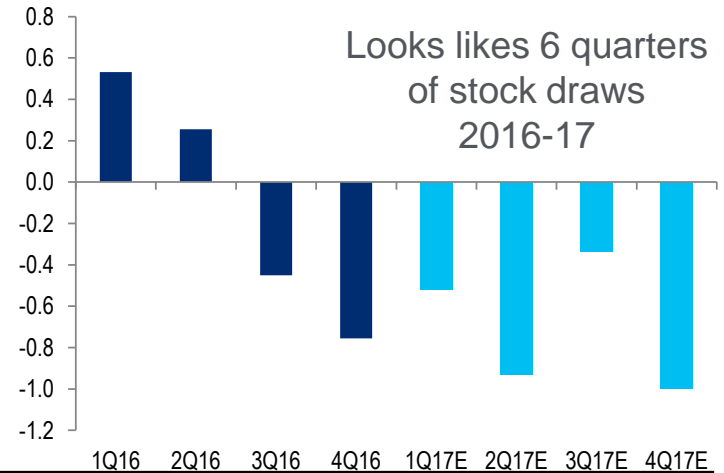


# The Path for Oil Inventories in Three Potential Oil Worlds

Global Crude, Product and NGL Stocks (bln bbls)

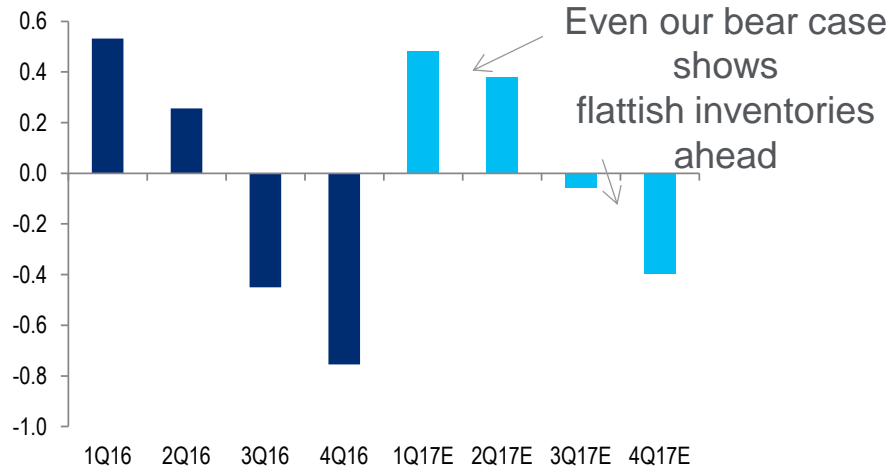


Base Case Estimated Stock Change (m b/d)



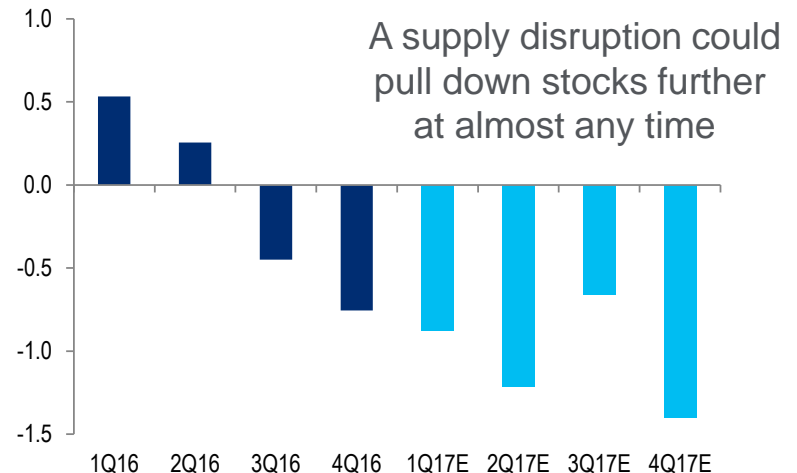
Brent (\$/bbl)	1Q16	2Q16	3Q16	4Q16	1Q17E	2Q17E	3Q17E	4Q17E
	35	47	47	51	50	54	60	65

Bear Case Estimated Stock Change (m b/d)



Brent (\$/bbl)	1Q16	2Q16	3Q16	4Q16	1Q17E	2Q17E	3Q17E	4Q17E
	35	47	47	51	42	47	46	49

Bull Case Estimated Stock Change (m b/d)



Brent (\$/bbl)	1Q16	2Q16	3Q16	4Q16	1Q17E	2Q17E	3Q17E	4Q17E
	35	47	47	51	55	64	73	70

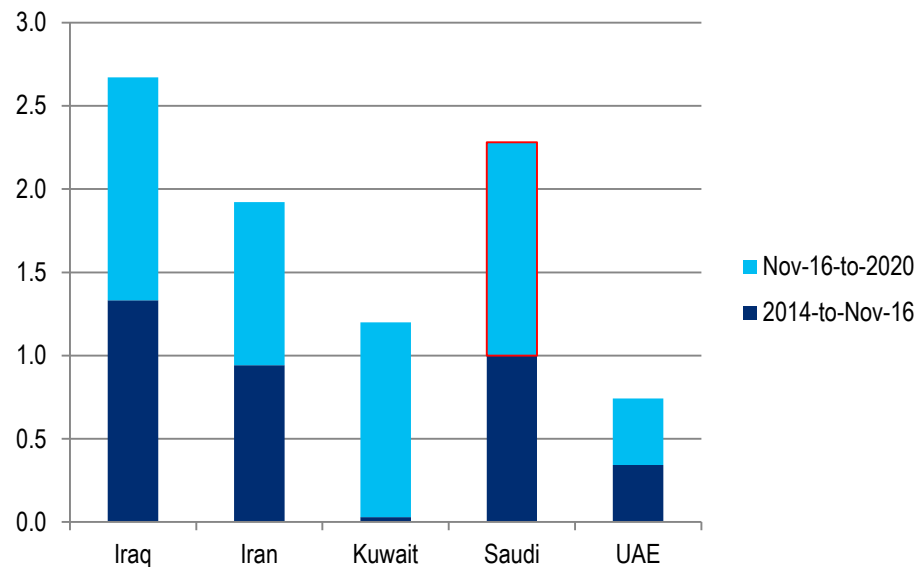
Source: IEA, EIA, JODI, METI, APEX, Chinese Customs, Citi Research Estimates

# OPEC Walks Back its Free Market Approach

Middle East OPEC Targeted Crude Capacity by 2020 (k b/d)

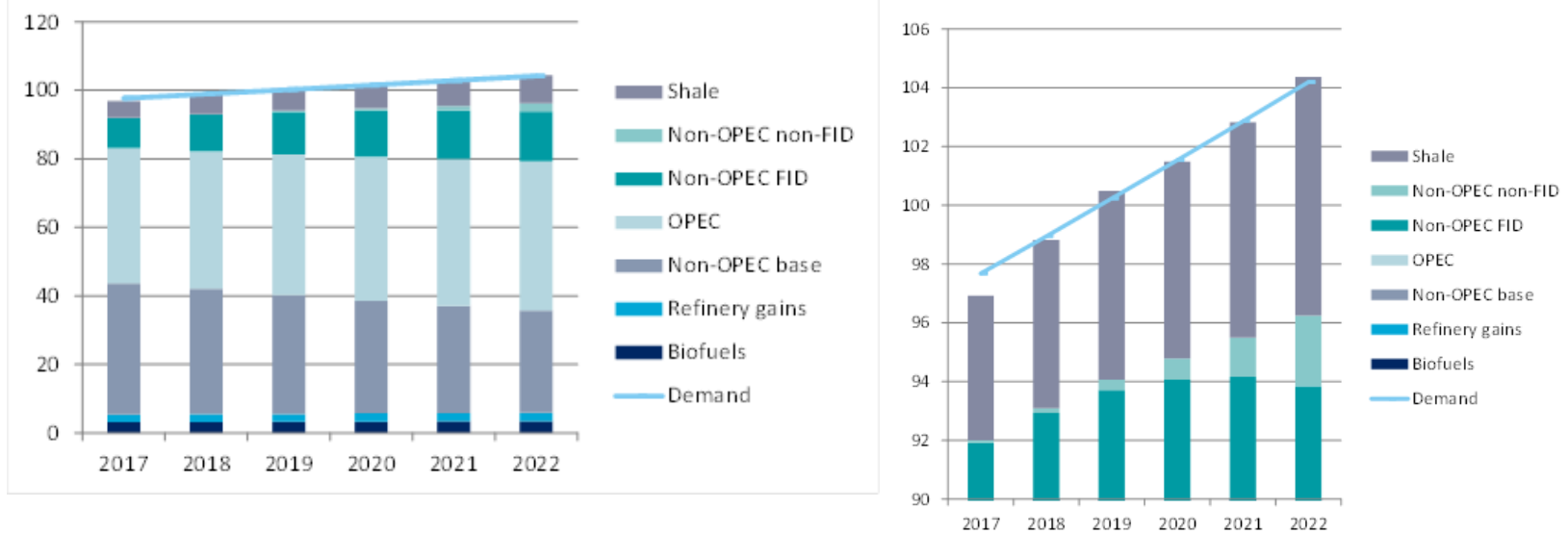
k b/d	<<<Output Targeted Capacity>>>							NOC	Citi	Citi	Source
	2014	2015	2016	Nov-16	2017E	2018E	2019E	2020E	2020E	2022E	
Iraq	3,330	4,041	4,379	4,661	-	-	-	5,500/6,000	5,000	5,150	SOMO
Iran	2,879	2,861	3,775	3,821	-	-	-	4,800	4,100	4,300	NIOC/Woodmac
Kuwait	2,800	2,783	2,856	2,830	3,165	-	-	4,000	3,100	3,200	KPC
UAE	2,758	2,880	3,015	3,100	-	3,500	-	3,500	3,450	3,550	ADNOC
<b>OPEC-4</b>	<b>11,767</b>	<b>12,565</b>	<b>14,025</b>	<b>14,412</b>	-	-	-	<b>17,800/18 300</b>	<b>15,650</b>	<b>16,200</b>	-
<b>Incremental Growth</b>	-	-	-	-	-	-	-	<b>3,540/4,040</b>	<b>1,238</b>	<b>1,788</b>	-
Saudi Arabia	9,720	10,166	10,320	10,720	-	-	-	12,000	12,000	12,000	Aramco/Vision 2030

Middle Eastern OPEC 2020 Capacity Growth Targets (m b/d)

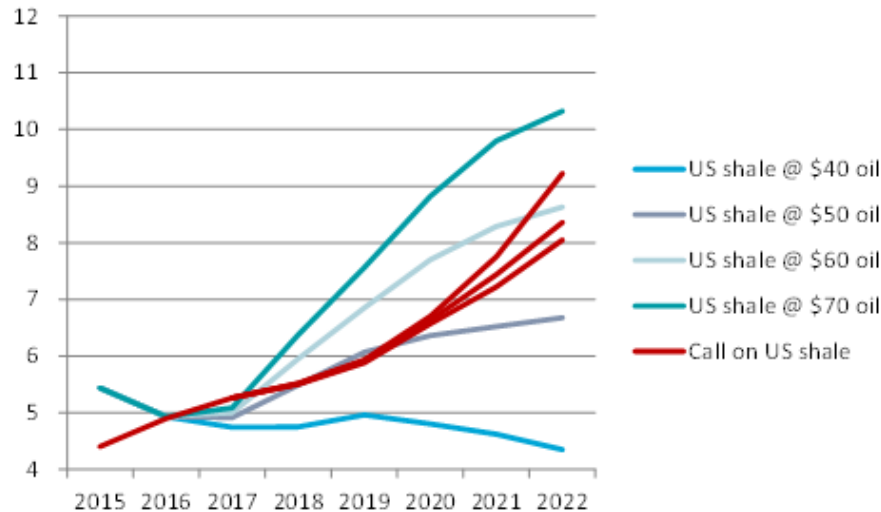


# Shale and OPEC Policy Should Drive Medium Term Oil Pricing

Illustrative medium-term balances with 5% declines on non-OPEC base, 1.3% demand growth



Call on US Shale in the Medium Term (m b/d)

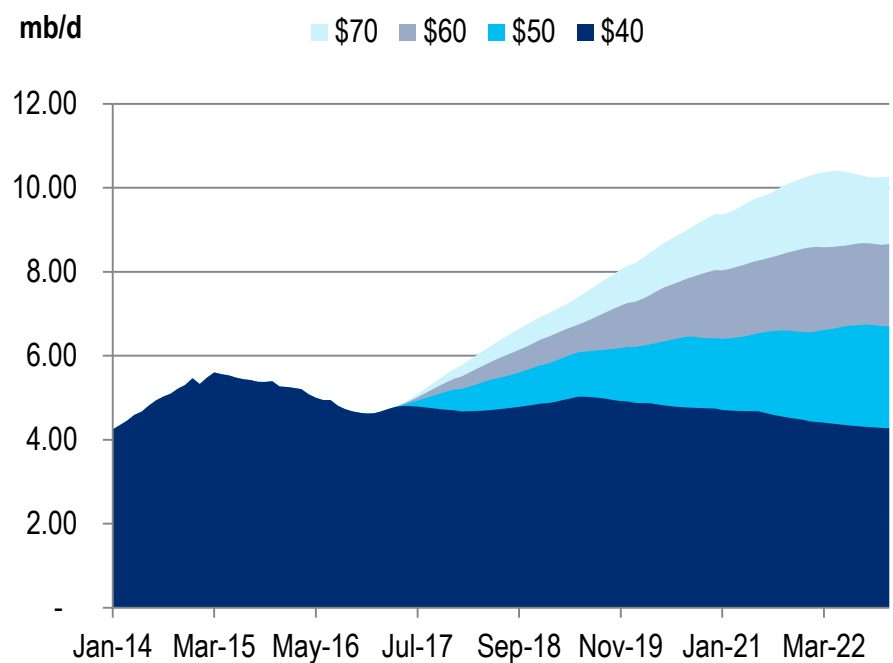


# \$50/bbl is a Key Level for US Shale to Grow

The trajectory of US production will depend significantly on how prices evolve over the next two years. At \$40/bbl, US production growth flatlines, but even \$50 would bring growth back in key areas.

- **Cost declines and productivity gains have made US production more resilient at lower prices than was ever anticipated to be possible.** Already, drilling activity has begun to pick up with oil prices in the high \$40s. We estimate that US shale oil production could return to the previous peak of ~5.5-m b/d reached in early 2015 by end-2018 even if prices were to stay flat at \$50/bbl.
- **Higher prices could spur an even more dramatic return of shale production growth.** WTI at \$70 would bring shale production back to its previous peak by end-2017 according to our estimates, with production potentially growing another 1.1-m b/d exit-to-exit by end 2018.
- **But several key uncertainties could shift these trajectories:**
  - **The rate of cost reflation:** Dramatic cost declines have made much of shale production profitable at \$50-\$60/bbl, but costs may begin to rise as utilization picks up.
  - **The evolution of productivity gains:** Increases in the initial production of shale wells could slow as drilling activity picks up, as producers move away from core areas

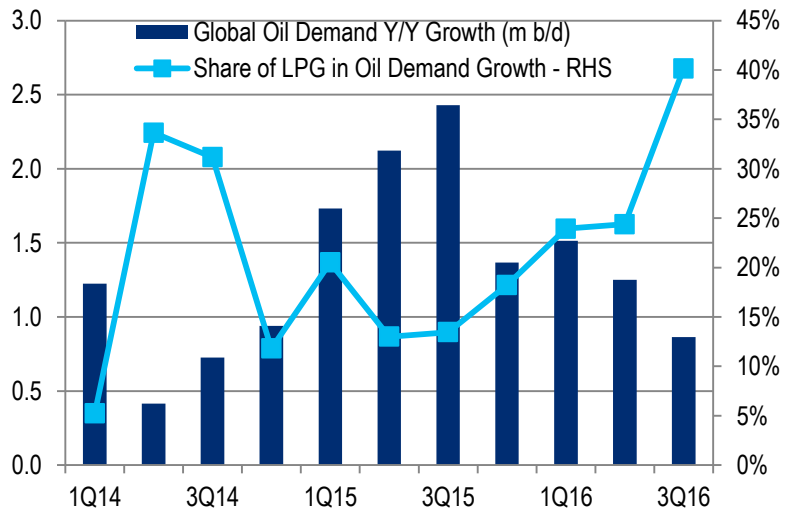
Shale Production Trajectories Under Various Prices



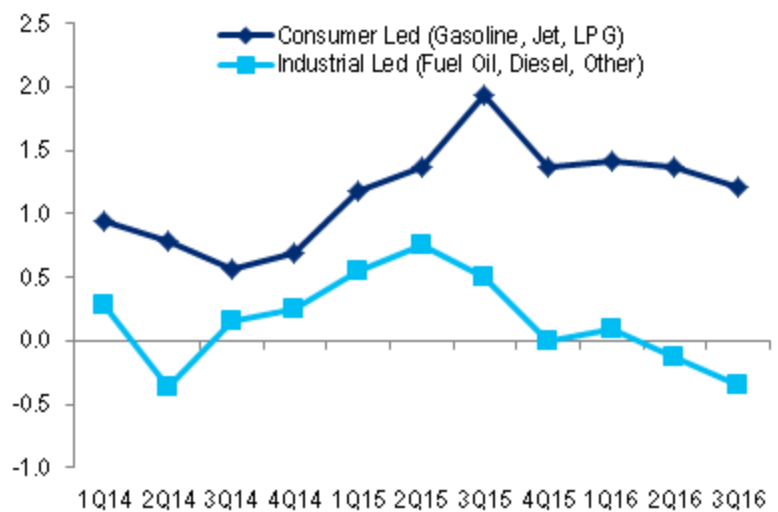
# 2016 Oil Demand Trends to Continue into Next Year

- Oil demand growth is expected to moderate to 1.1-m b/d in 2017, after growing at 1.3-m b/d in 2016. A number of underlying trends are expected to persist through 2017
  - The share of LPG in oil demand growth is expected to stay at high levels, which is less supportive for refinery margins given the high volume of LPG coming directly from field production.
  - Industrial petroleum product demand should continue to struggle in a low industrial and trade growth world, particularly in emerging markets, while gasoline demand should continue to register positive growth.
  - Middle Eastern, FSU and Latin American oil demand growth should bounce back as higher oil prices stimulate oil demand growth in oil producing groups.

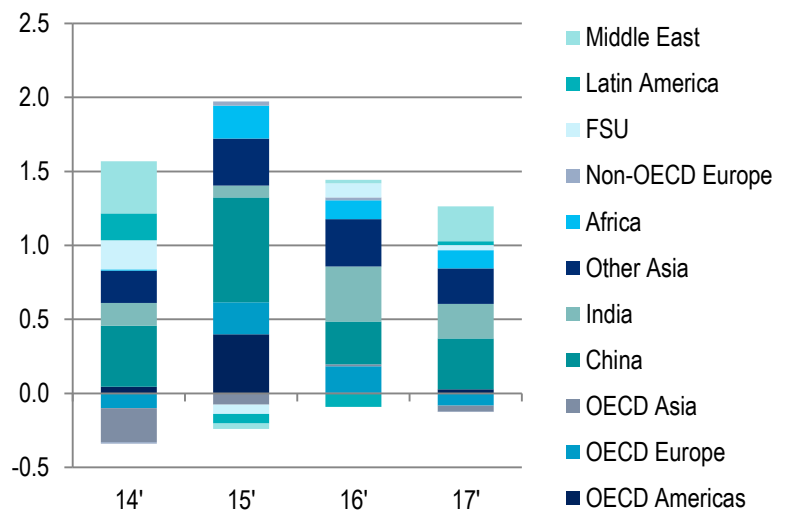
LPG Share of Global Oil Demand Growth (%)



Y/Y Oil Demand Growth by Product Type (m b/d)



Oil Demand Growth by Region (m b/d)

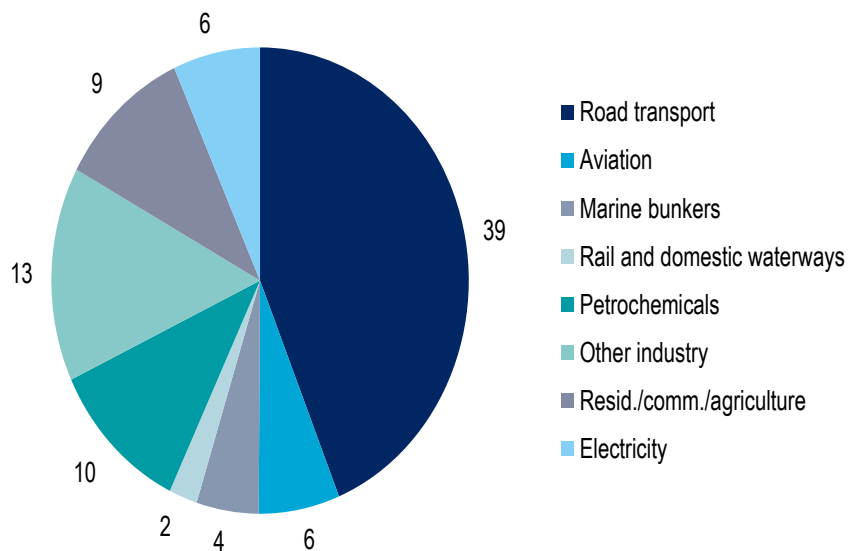


Source: IEA, PPAC, Citi Research estimates

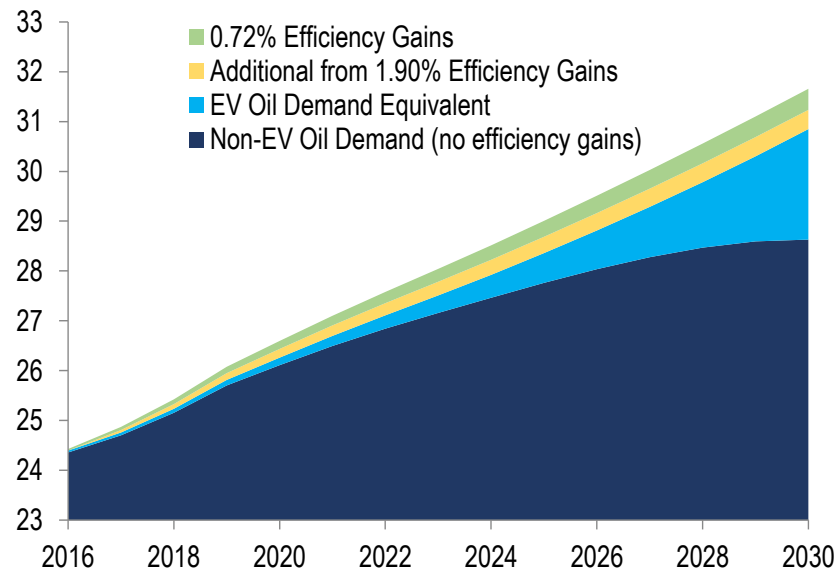


# There Are Numerous Long Term Threats to Oil Demand Growth

2015 Oil Demand by End Usage (m b/d)

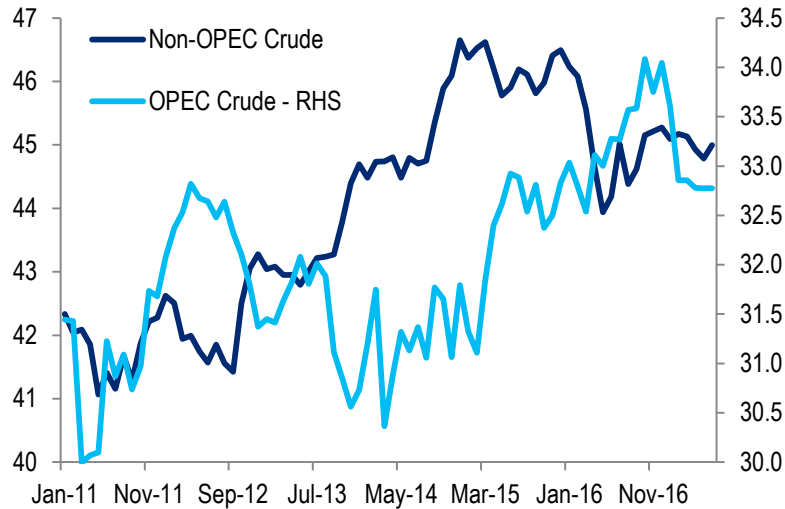


Passenger Vehicle Oil Demand (m b/d)

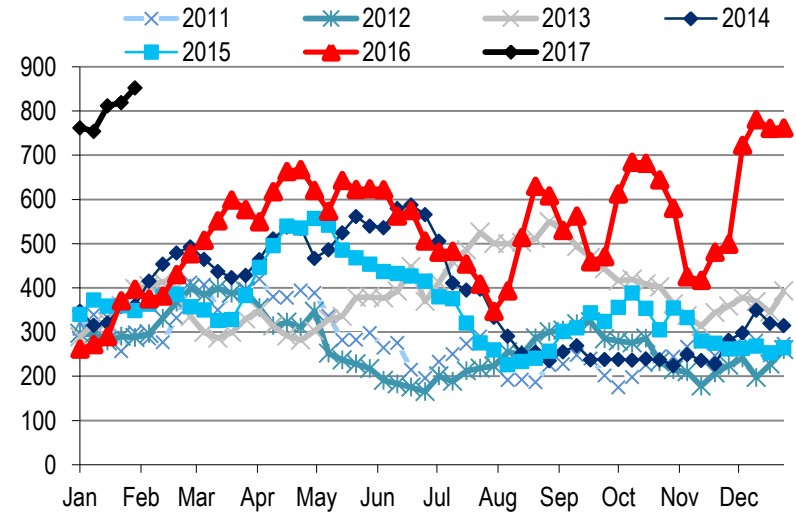


# OPEC Compliance Has Kept the Shorts Away

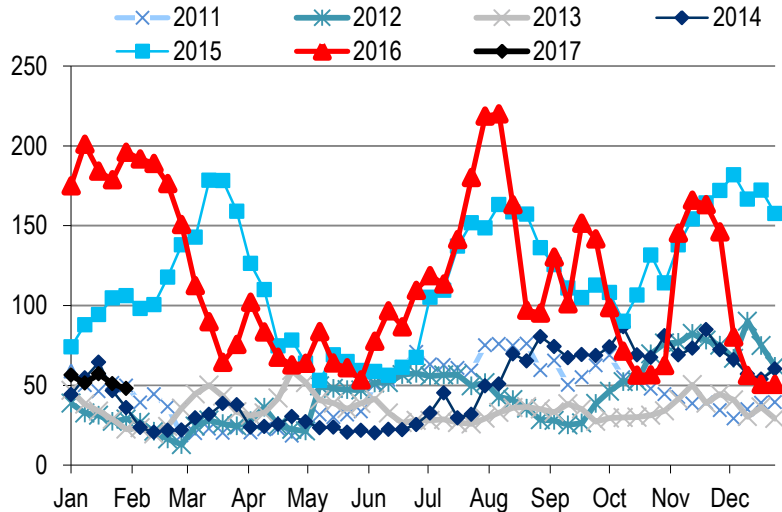
## OPEC vs. Non-OPEC Crude Production (m b/d)



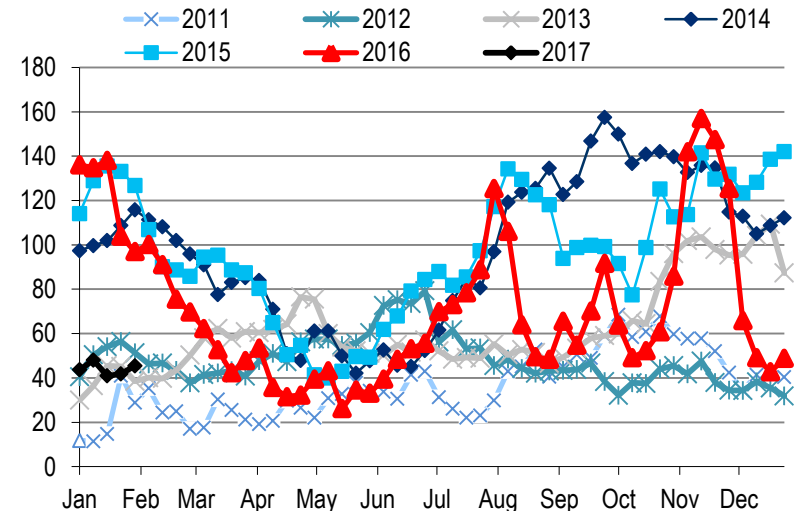
## Crude Managed Money Net Length (k lots)



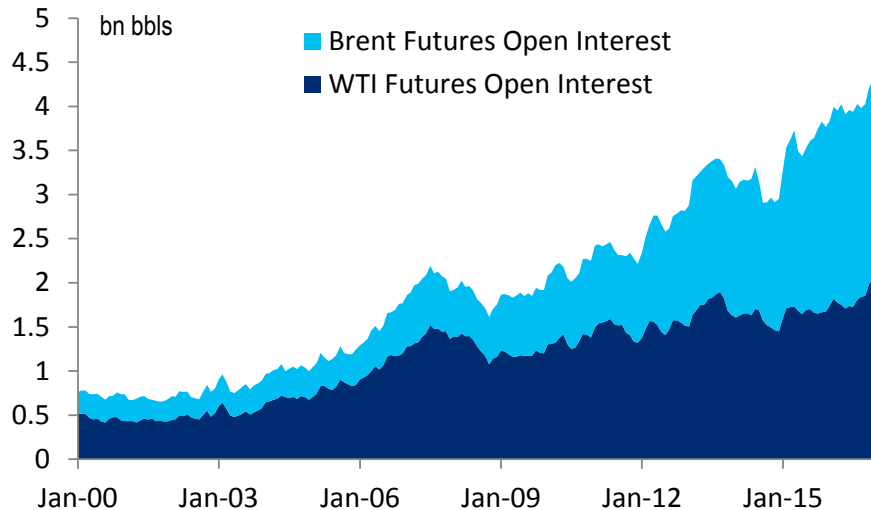
## WTI Managed Money Gross Shorts (k lots)



## Brent Managed Money Gross Shorts (k lots)



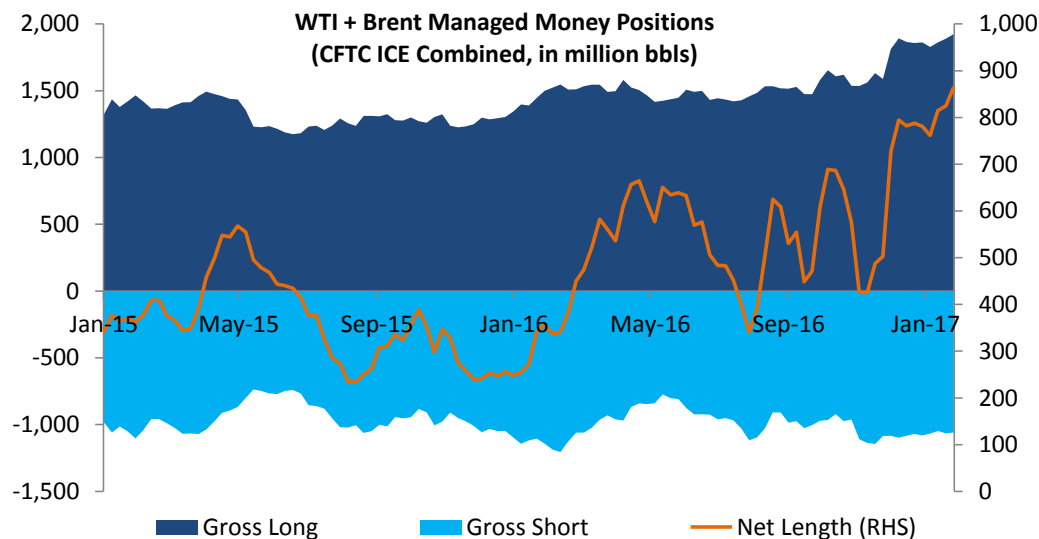
# But the quest for price stability will be Sisyphean



- As financial flows into and out of commodities mushroom and the investor focus on returns become increasingly short-term they pose risks for price stability. Combined open interest in WTI and Brent on the CME and ICE exchanges were at a combined 2.95-bil bbls at the end of 2014, but rose to 3.77-bil bbls (+28%) at the end of 2015; they ended 2016 at 4.3-bil bbls (+14%), rising a combined 48% over the two year period.

- The fickle nature of these flows is also palpable, with combined net length of 341-mm bbls in early August 2016, rising in three waves (and falling in two waves) since then, coinciding with the ups and downs of perceptions of whether OPEC would forge an agreement on its own and with non-OPEC.

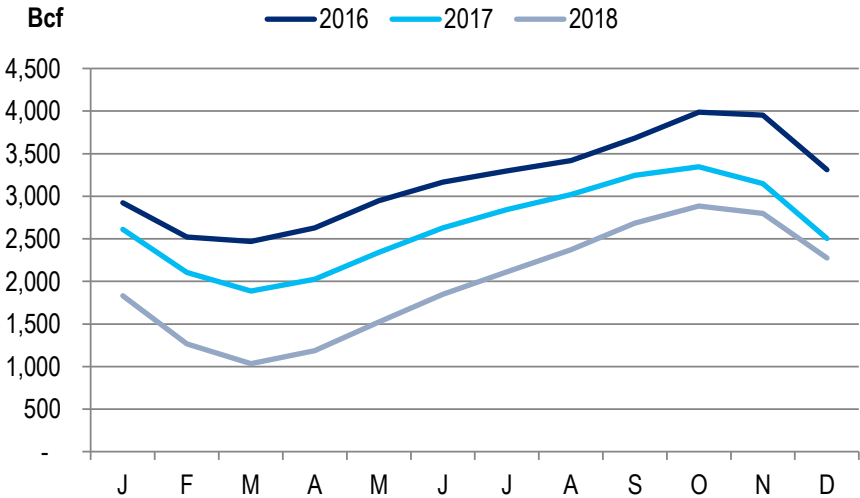
- Current net length of 865-mm bbls (higher than the physical SPR!) hangs over the market, with the inventory of financial barrels up 524-mm bbls since August. Bearish news in February, with inventories building in the US (while imports from Saudi Arabia, lifted last year are expected to rise), could create a financial sell-off with bearish price-consequences.



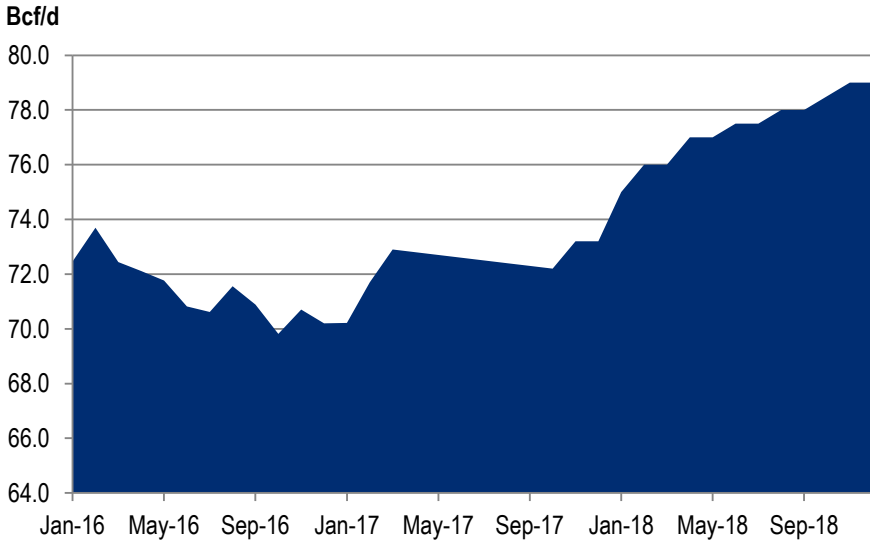
Source: Bloomberg, Citi Research Estimates

# US natural gas balances shows tighter market in 2017

### US Lower 48 Inventories 2016-2018



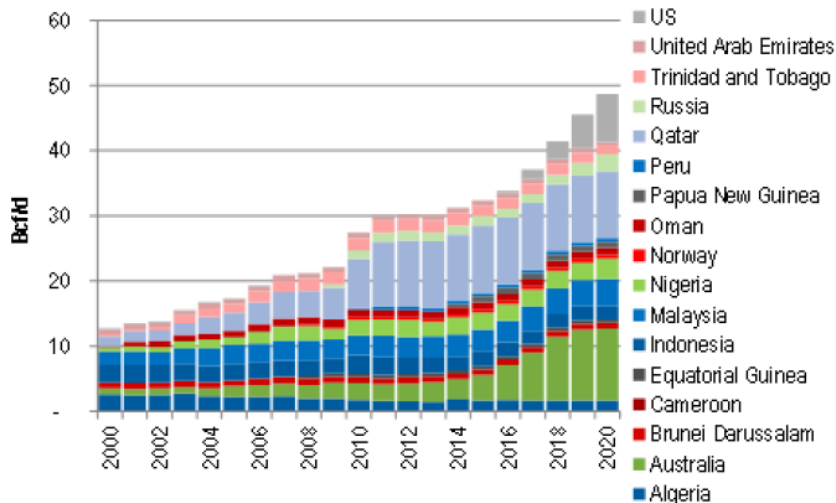
### US Lower 48 Inventories Natural Gas Production



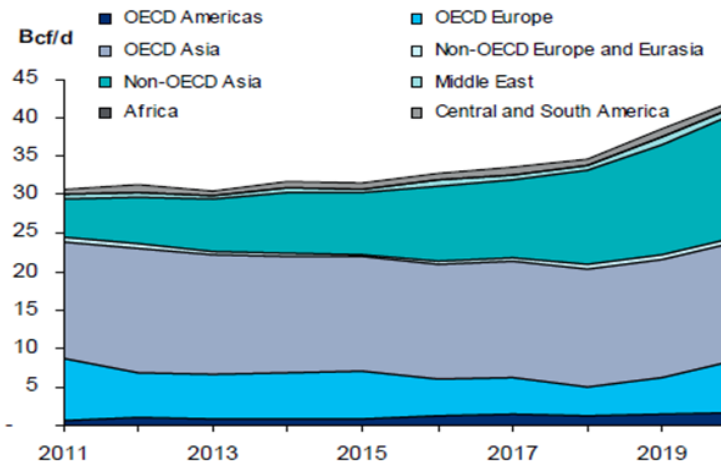
Source: EIA, Citi Research

# But with an oversupplied LNG market and global markets more connected...

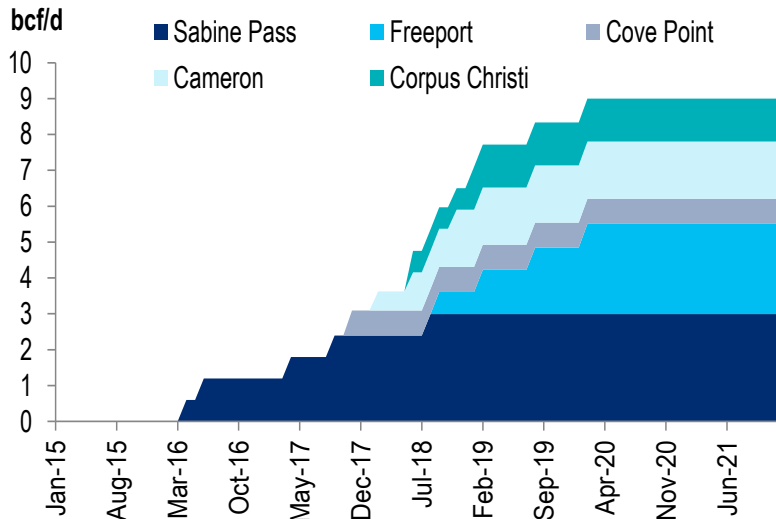
Global LNG supply, counting those already operating and under construction, should surge...



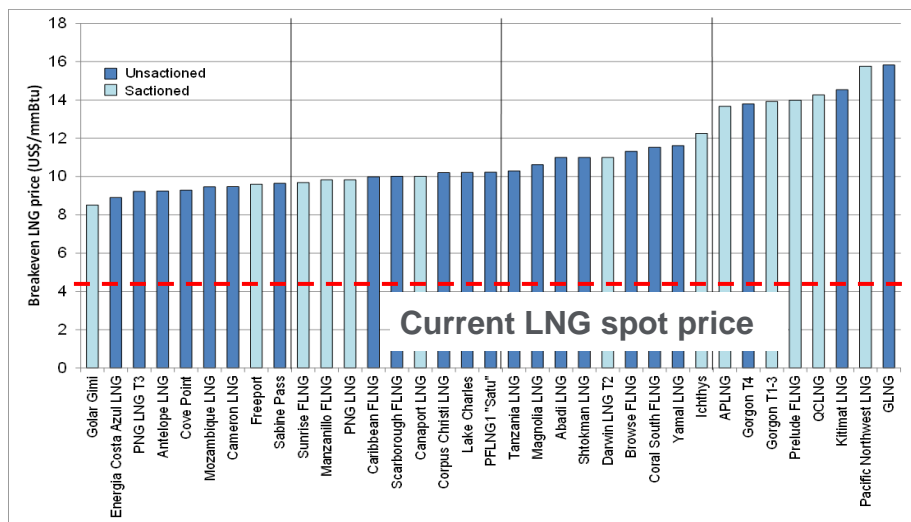
...but global LNG demand growth looks very weak for ~5 years, possibly leading to a global oversupply of nearly 10-Bcf/d; LNG prices could remain in the \$4/MMBtu range



... with strong contribution from the US



Low LNG prices make sanctioning new liquefaction difficult



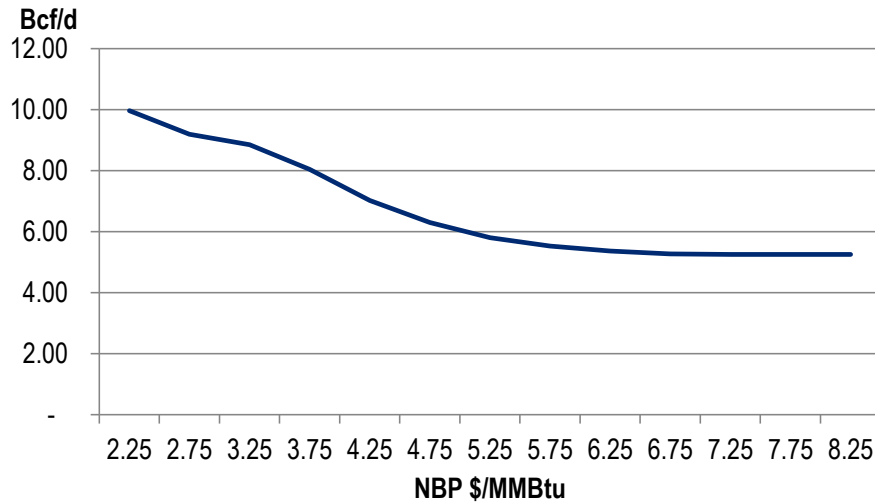
Source: Woodmac, EIA, Citi Research

\* The red dashed line is the amount of new gas needed in 2017 to offset natural production declines at key plays and meet the growth of exports and demand; the green dashed line is what's needed in 2018

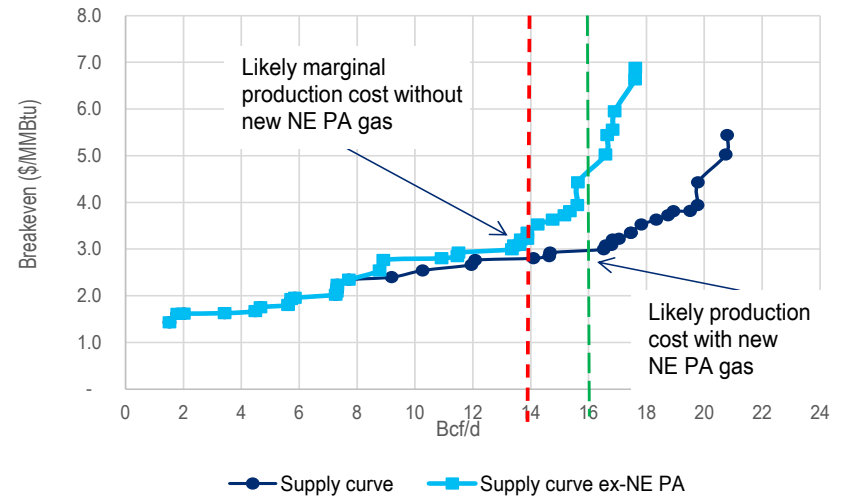
# ...Prices may fall post-2018 to disincentive supply, stimulate demand

There are several key areas that will likely adjust to balance the market (1) Higher cost supplies (i.e. US and Australia) will be partly curtailed (2) Fuel switching in the power sector in Europe to increase natural gas burn (3) Domestic production and piped exports may be backed out, if the economics of LNG look advantaged

### Coal-to-gas Switching Curves in Europe

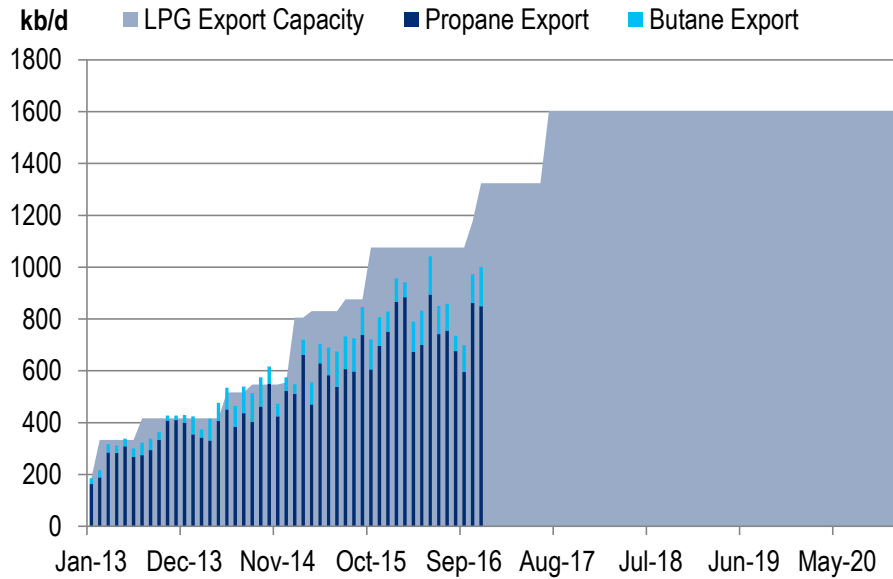


### US Shale Production Cost Curve



# US LPG exports no longer constrained by capacity, only exportable surplus

## LPG Export Capacity Current/Sanctioned and LPG Exports



## Global Ex-North America LPG Short vs North America Exportable Supplies



## US Propane Supply/Demand Balance

Propane	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Production</b>	<b>1.14</b>	<b>1.18</b>	<b>1.26</b>	<b>1.39</b>	<b>1.57</b>	<b>1.70</b>	<b>1.70</b>	<b>1.80</b>	<b>1.88</b>	<b>1.99</b>	<b>2.04</b>
PADD 1	0.05	0.06	0.06	0.08	0.12	0.15	0.15	0.16	0.18	0.19	0.19
PADD 2	0.23	0.24	0.26	0.29	0.34	0.39	0.41	0.48	0.53	0.60	0.63
PADD 3	0.71	0.72	0.77	0.85	0.93	0.98	0.95	0.97	1.00	1.03	1.06
PADD 4	0.10	0.11	0.11	0.11	0.12	0.14	0.15	0.13	0.12	0.12	0.11
PADD 5	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05
<b>Demand</b>	<b>1.16</b>	<b>1.15</b>	<b>1.18</b>	<b>1.28</b>	<b>1.17</b>	<b>1.16</b>	<b>1.18</b>	<b>1.20</b>	<b>1.23</b>	<b>1.23</b>	<b>1.23</b>
<b>Production - Demand</b>	<b>(0.02)</b>	<b>0.03</b>	<b>0.09</b>	<b>0.11</b>	<b>0.40</b>	<b>0.54</b>	<b>0.53</b>	<b>0.59</b>	<b>0.65</b>	<b>0.76</b>	<b>0.81</b>

# Trump Brings New Wildcards to the Existing 2017 List

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1. Iranian Sanctions
2. Iraqi production
3. Libya
4. Nigeria
5. Iran
6. Venezuela
7. Border Tax Adjustment
8. Trade with Canada and Mexico
9. JASTA/Saudi legislation
10. RFS2 and EPA rollback
11. EPA rollback of infrastructure and production growth
12. Infrastructure for pipelines, storage and port facilities in the US and N. America
13. Russian Sanctions
14. Confrontation with China
15. Spillover from Chinese speculation on local exchanges.
16. Impacts of accelerated US production growth



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