



June 26, 2017

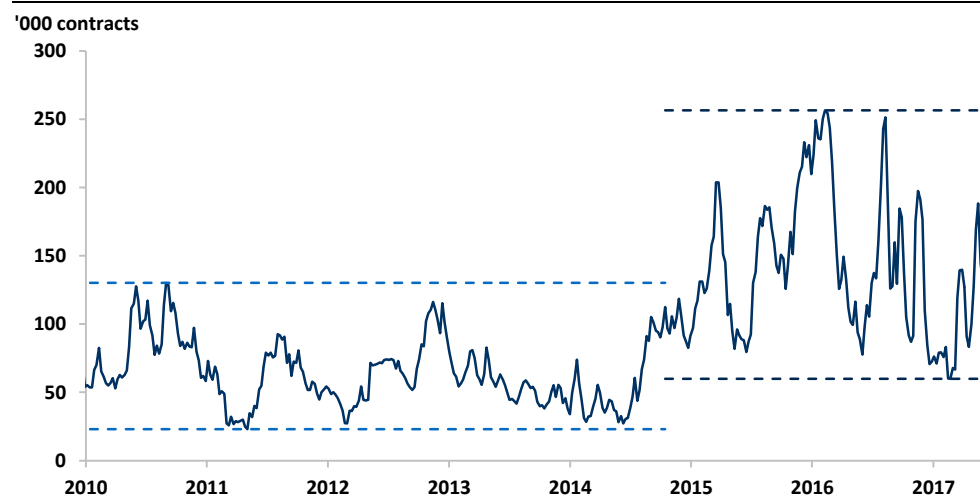
## Oil Strategy: The Tale of the Tourist

- The oil market has, over the years, attracted significant participation from non-commodity traders. This increases the knowledge gap for a growing group that can inadvertently crowd trades, alter sentiment, and increase volatility. In this publication, we highlight several examples of data releases that are frequently misinterpreted by “tourist traders”.
- Bloomberg’s “Street consensus” estimate of weekly US crude stock change is inherently flawed due to extremely low participation rates and tremendous skew risk. This means that an absurdly low number of individuals set “consensus” for an entire market.
- API storage numbers often diverge from the EIA. The Cushing stock change number is often the only API data point that is credible while issues with sample size cloud the rest.
- Is the back end of the forward curve lying to us? Liquidity gaps and poor price discovery have outsized implications for how we think about the next cycle.

### The Cost of Tuition

Blocking out headline noise and focusing on slowly improving oil market fundamentals is easier said than done, particularly given the violent price moves of late. We have entered a new era in the oil market. This time, we are not focusing on new drilling techniques, innovations in technology, or improving efficiency gains. Instead, we have entered a period in which oil prices can dislocate from oil market fundamentals for longer periods of time than historically has been the case. Current market sentiment is extremely binary, and the herd mentality is wicked strong. Compared to earlier this decade, the baseline level of investor shorts in the market has more than doubled since oil prices first started falling in mid-2014. The current elevated level of impulsive positioning is unprecedented from both: 1) the absolute base level of investor shorts in the market; and 2) the sheer pace of the positioning from entry to exit, which is seemingly occurring at a faster rate than in the past. Why the level of volatility pertaining to both price and positioning has changed over time lies within how the chemical makeup of participants who trade the underlying commodity has evolved. Oil market intelligence has been diluted over recent years given the rise of algorithmically charged participants from what historically was a physically driven market. The fundamental knowledge gap means that an increasing number of market participants is swayed by headlines rather than counting the physical barrels.

Figure 1: NYMEX and ICE Managed Money WTI Short Positioning



Source: RBC Capital Markets, CFTC

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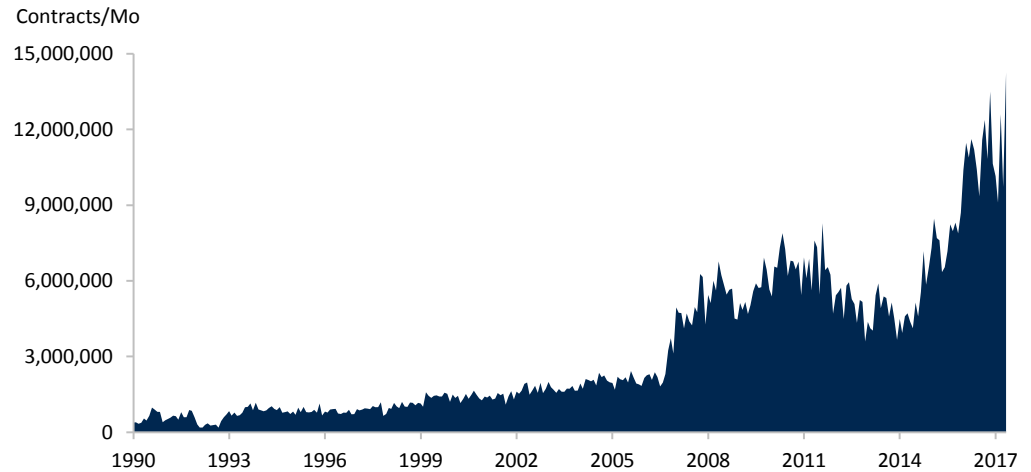
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All values in USD unless otherwise noted.

Priced as of prior trading day's market close, ET (unless otherwise stated).

**For Required Conflicts Disclosures, please see page 9.**

Figure 2: WTI Contracts Traded per Month



Source: RBC Capital Markets

Throughout the history of the oil market, participants have shuffled seats but the fundamental knowledge base remained intact...until recently

### The Financialization of the Oil Market

The evolving arena of oil market participants is reshaping how we think about everything ranging from market volatility to liquidity to simply even how data is interpreted. A market backed by a physical underlying commodity means that prices should typically not diverge meaningfully from true supply and demand fundamentals before converging again. Added volatility over recent years has seemingly resulted in the cycles of dislocation becoming longer and more drawn out. The base increase in the level of volatility stems from the notion that a historically physical market has developed into much more of a financially driven or paper market over recent years. Two decades ago, it was the merchant energy companies, physical players, and those who had a masterful understanding of the fundamentals behind supply, demand, and shipping logistics who dominated the oil market.

The fall of Enron and the demise of several other energy merchants in the early 2000s resulted in a subsequent liquidity gap, which was ultimately filled by financial institutions. Banks had previously not ventured into the space outside of the few who owned physical assets. The next step in the evolution process coincided with the rise of commodity hedge funds in the middle of the last decade. As such, trade volumes expanded as the financial derivative market matured. Throughout the evolution, the participants in the market shuffled seats, but the fundamental knowledge base of the career energy trader remained intact.

### Man vs. Machine

Instability around the Financial Crisis followed by several years of elevated oil prices meant that either energy traders made out exceptionally well or their funds were forced to liquidate earlier this decade. The near extinction of pure-play energy hedge funds coincided with a period in which several major investment banks exited the commodity trading space. Volumes traded dipped early this decade, but the void due to vanished career energy traders was quickly filled by the rise of algorithmically driven funds or black boxes. The liquidity gap was further backfilled by [tourist traders](#) or industry generalists who trade a broad macro basket. In other words, the liquidity gap was quickly filled, but the expertise and brain drain from the industry continues to loom large. The physical oil trading community has become increasingly financialized.

The physical oil market has become increasingly financialized



Larger volumes are being traded at a faster pace by participants who are less dedicated to the fundamentals of the oil market

Bloomberg's "consensus" survey for weekly crude stock change at Cushing consists of an absurdly small handful of individuals

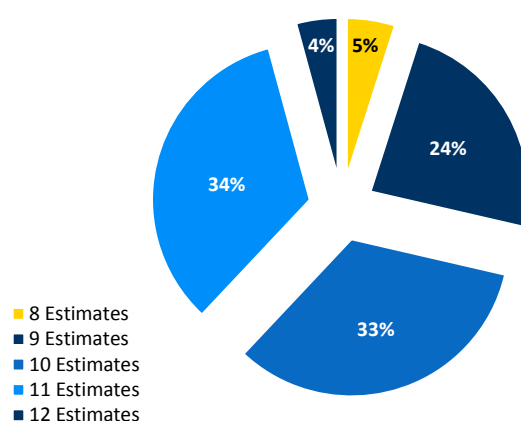
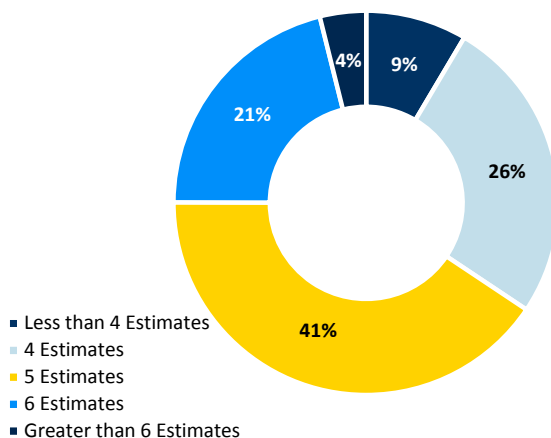
A growing portion of the trading community is becoming increasingly headline-focused rather than fundamentally counting the barrels. The media angle is becoming progressively more influential in shaping sentiment than the raw data is. Financial volumes crossing hands today are seven times higher than was the case a decade ago.

Put simply, the sheer volume of paper contracts being traded is occurring at a higher notional level, turning over at a faster pace by a growing number of traders who are less informed on the inner workings of the crude market than previously was the case. Unearthing gems from deep dive, intellectually rigorous fundamental analysis can often lead one to arrive early on a market call. Being early has historically allowed traders to properly position for a view to run its course, but in today's market, one must be able to endure the extreme price gyrations before the view materializes. This is because prices can dislocate from market fundamentals for seemingly larger stretches of time than historically has been the case. There is no silver bullet to rectify the structural change in the market, but keen awareness is a step in the right direction.

### Who Owns Market Consensus?

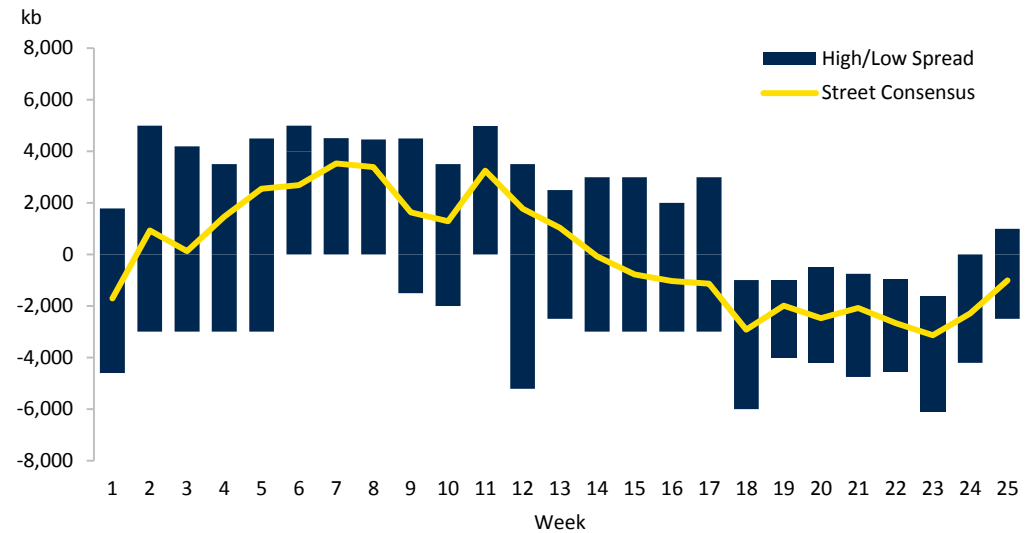
Rudimentary statistics have taught us that conducting an empirical study to hold any sort of statistical power with an acceptable level of precision requires the inclusion of an adequate number of observations. This is where the Bloomberg consensus estimate for weekly US inventories is a letdown. The sample size for coming up with the "Bloomberg Analyst Consensus" for the weekly Cushing storage data release has, on average, surveyed a whopping 4.3 people so far this year. Simply put, these four individuals set the consensus that is watched by an entire market. Most people should know that the consensus Bloomberg estimate is a voluntary survey with abysmal participation, which again at best relies on the brain trust of a few individuals stemming from a survey in which the bar for participation is minimal. The market is often reactive to the EIA storage release as bullish or bearish relative to consensus. This is appalling given that on April 12 of this year, the 400 kb "expected" Bloomberg consensus crude stock build at Cushing consisted of a simple average of numbers that were submitted from three brokerages, with expectations ranging from a build of 1.1 mb to unchanged for the week. Bloomberg averaged the ridiculously small sample size of widely ranging estimates to come up with the "average consensus" view of a 400 kb stock build. The math was as follows:  $(1,100 \text{ kb} + 100 \text{ kb} + 0 \text{ kb})/3 = +400 \text{ kb}$ .

Figure 3: Participants in BBG's Weekly Cushing Inventory Survey Figure 4: Participants in BBG's Weekly Crude Inventory Survey



\*Forecasts dating back to 2015  
Source: RBC Capital Markets, Bloomberg

Figure 5: 2017 Weekly Bloomberg US Crude Storage Estimates (High, Low, and “Consensus”)



Source: RBC Capital Markets, Bloomberg

**Bloomberg’ analyst consensus poll is misleading due to the lack of participation**

**The small sample size of estimates that constitute “consensus” is massively skewed by extreme forecasts stemming from either high ballers or low ballers**

The EIA reported a stockbuild of +276 kb that day, which appeals to the naked eye as a slightly constructive, smaller than “consensus” build. What matters more is that had the participant who estimated a build of 1.1 mb been absent that week, the sample set would consist of two individuals who would build the consensus estimate of  $(+100 \text{ kb} + 0 \text{ kb})/2 = +50 \text{ kb}$ . Under that scenario, the 276 kb release would now look bearish compared to the “industry estimate” of a 50 kb build. Market bulls should thank their lucky stars that the highballing analyst forecasting the 1.1 mb build showed up for work that week.

The sample size does not improve materially when polling for the weekly total US crude forecast given the participation rate of 9.6 individuals each week, on average so far this year. The spread between the highest forecast and the lowest estimate for weekly stock change has averaged a massive 4.8 mb on a weekly basis so far this year. Even the week with the tightest divergence among estimates was still a wide 1.8 mb. In other words, the simple average of the small sample size of estimates that constitute “consensus” is massively skewed by extreme forecasts stemming from either high ballers or low ballers.

The quality control of these surveys may be lacking and they should not be accepted as rigorous expectations drawing parallels to meticulously conducted, well-informed estimates of company-level earnings per share or expectations pertaining to the Federal Reserve. By nature, quants should understand the potential pitfalls of data integrity, but without a look behind the curtain, many market participants are not aware that the law of large numbers simply does not hold with Bloomberg’s consensus forecasts. The Bloomberg analyst estimate for weekly oil stock change differs from the natural gas survey, which is more credible given the larger sample size of pedigreed, fundamentally driven industry experts stemming from banks, physical trading shops and dedicated research vendors.

### The (Mis)interpretation of Weekly Storage Data

Part of understanding market psychology involves anticipating how data releases are interpreted by other market participants. Disparity among US storage data providers between the American Petroleum Institute (API) and the Energy Information Administration (EIA) often causes copious amounts of confusion for market participants. The EIA data is officially stamped by the government, but the competing API data release occurs a day prior, which traders often use as a peek into what the EIA release may bring. The problem is that the data sets often fail to match. The crux of the discrepancy lies within how each agency

**The voluntary nature of how the API collects its data means that its survey sample is a moving target every week**

surveys US storage operators and refiners. While both parties conduct weekly surveys to arrive at certain storage numbers, the government-run EIA survey is a compulsory one that is enforceable by federal law. Conversely, the API survey is collected on a voluntary basis, and although the API has suggested that its sample size of reporting entities is north of 80% of the total universe, the unenforced nature of the data collection process means that the absentee ballot can vary from week to week. In other words, the actual surveyed sample could potentially be a moving target every week. The questionable coverage universe can often leave blind spots, sway sentiment, and misrepresent reality. Two recent egregious examples from earlier this month include a report from the API suggesting that crude inventories drew by -4.6 mb, only to be overridden by the EIA's headline of a +3.3 mb build. The following week saw the reverse occur, with API data suggesting that US crude stocks increased by +2.8 mb, only to have the EIA reveal a -1.7 mb stockdraw the following day.

On a year-to-date basis, API stocks have, in aggregate, underestimated total US crude stockbuids by some 12 mb. And while there are gyrations on a week-to-week basis between the EIA and API's estimate of Cushing inventories, the margin of error is typically fairly small. The notional level of stocks drawn at Cushing this year is virtually identical across both agencies. Statistically speaking, the relationship between the API and EIA data sets is often directionally aligned, but the R-square remains a lukewarm 66% as it pertains to total US crude stocks. Alternatively, the mathematical relationship is materially stronger when isolated exclusively to Cushing, with the regression suggesting a 77% relationship between the two data sets.

**The Cushing stock change number is the most credible figure in the API data set**

How can this variability be explained? Simply put, the API's data collection at the Cushing storage hub is excellent, with virtually all-encompassing overlap with the EIA. Put another way, there are only a handful of storage operators at Cushing and they all have tremendous track records of data reporting both on a voluntary basis to the API and on a mandated basis to the EIA. This means that the weekly Cushing stock change number is the most credible figure released by the API. The weekly Wednesday EIA storage release is the truth, but a data-starved, opaque, headline-driven market means that sentiment can often be swayed by the API data release from the prior day.

Figure 6: Weekly Cushing Stock Change, API vs. EIA\*

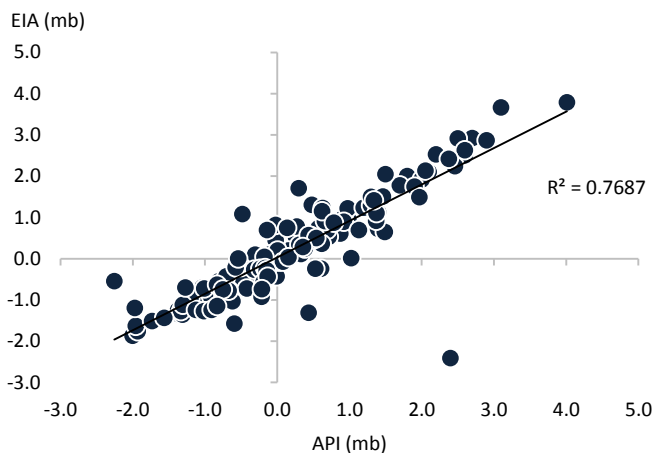
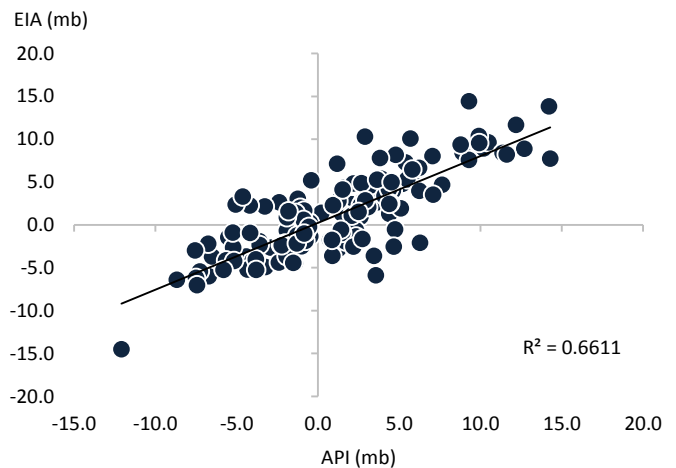


Figure 7: Weekly US Crude Stock Change, API vs. EIA\*



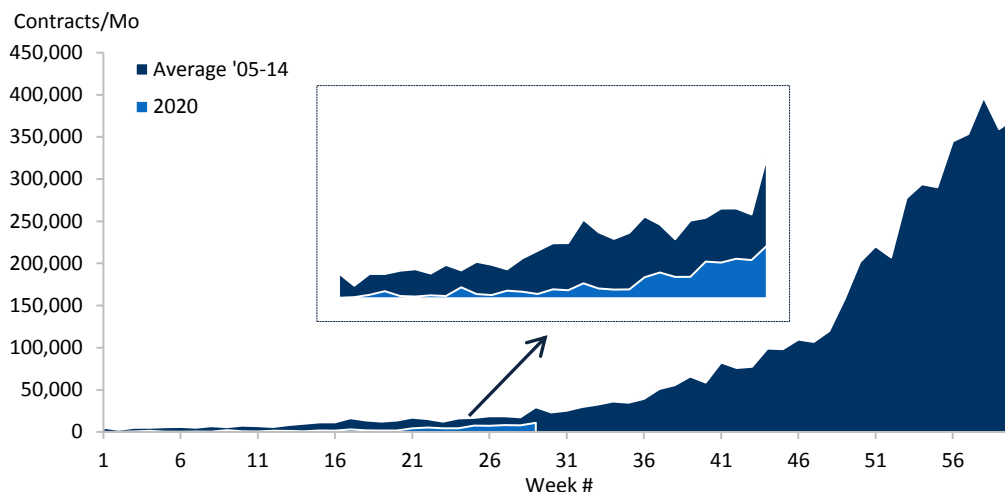
\*Based on past three years of data  
Source: RBC Capital Markets, EIA, API

**Deteriorating liquidity in the dated portion of the forward curve means that true price discovery has worsened over recent years**

### Is the Term Portion of the Forward Curve Lying to Us?

Market attention remains fixated on spot oil prices, but the term structure, or the forward curve, has outsized influence when considering future supply and demand balances. In fact, the forward curve may be lying to you. The market understands that the forward curve is not a forecast of future prices, but rather where one can buy or sell forward a barrel of oil today for future delivery. The problem is that liquidity is not what it once was. Market makers will continue to show prices for producer and consumer hedging purposes for the longer-dated portion of the forward curve, but the deterioration of liquidity means that true price discovery has worsened over recent years. The oil price collapse has changed how oil companies approach hedging strategies. Producer hedges are not as prolific as was previously the case given that prices have, on balance, provided a dearth of economically feasible hedging opportunities. In addition to less attractive outright price levels, a credit-constrained environment means that the tenors have been shorter-dated, with 6-, 12-, and 18-month strips being hedged rather than the 24- to 36-month terms that were previously a normal occurrence. While liquidity has increased for near-term oil contracts with the intensified level of participation from algos and tourist traders, the liquidity in the term portion of the curve has not only dried up due to banks retrenching from the space, but the ability to absorb substantial and consistent longer-term hedge programs has yet to be tested.

Figure 8: Liquidity for December WTI Contract in Five Years Leading to Expiry\*



\*Week 1 denotes volume traded for December contract 60 months out, i.e., Week 1 volume for the Dec 2020 contract is Jan 2015.  
Source: RBC Capital Markets

**Poor price discovery in the forward curve has outsized implications for how we think about the next cycle of global investment**

Poor liquidity means that realized pricing can air pocket in either direction come execution time. While liquidity is often nebulous, poor price discovery has tangible outsized implications for how we think about the next cycle given that capping longer-dated prices takes the wind out of the sails of future investment decisions for many global projects.

The vast majority of [global projects are less elastic](#) to spot prices and more sensitive to the term outlook. Low term prices likely mean that most global projects will remain sidelined irrespective of spot pricing. With calendar year 2020 WTI pricing below \$50/bbl and 2025 pricing sub-\$55/bbl, we see the term portion of the forward curve as vastly underpriced. The forward curve, in its current form, suggests that low-cost, short-cycle projects can supply the market for the next decade with minimal greenfield participation from traditional, higher-cost conventional or offshore projects. Put another way, companies, regardless of size or stature, require the visibility and comfort of stable term prices in order to greenlight projects that will not bear fruit for several years after finalizing investment decisions.

Figure 9: Oil Price Forecasts

Price Forecast (\$/bbl)	2016					2017					2018				
	Q1	Q2	Q3	Q4	'16 Avg	Q1	Q2	Q3	Q4	'17 Avg	Q1	Q2	Q3	Q4	'18 Avg
WTI	\$33.63	\$45.64	\$44.94	\$49.29	<b>\$43.47</b>	\$51.78	\$51.75	\$53.50	\$57.00	<b>\$52.94</b>	\$56.50	\$58.00	\$60.50	\$63.00	<b>\$58.87</b>
Brent	\$35.21	\$47.03	\$46.99	\$51.06	<b>\$45.13</b>	\$54.61	\$54.00	\$56.50	\$60.50	<b>\$55.80</b>	\$59.50	\$60.75	\$62.75	\$65.00	<b>\$61.34</b>
WTI-Brent Spread	-\$1.58	-\$1.39	-\$2.05	-\$1.77	<b>-\$1.66</b>	-\$2.83	-\$2.25	-\$3.00	-\$3.50	<b>-\$2.87</b>	-\$3.00	-\$2.75	-\$2.25	-\$2.00	<b>-\$2.47</b>

Source: RBC Capital Markets

Figure 10: Global Supply & Demand Balance (mb/d)

Global Supply & Demand Balance mb/d	2016					2017					2018				
	Q1	Q2	Q3	Q4	YoY	Q1	Q2	Q3	Q4	YoY	Q1	Q2	Q3	Q4	YoY
<b>Demand</b>															
OECD	46.4	45.6	46.9	47.0	<b>0.5</b>	46.4	45.5	46.9	46.8	<b>-0.1</b>	46.3	45.2	47.0	46.7	<b>-0.1</b>
Non-OECD	48.8	49.9	49.9	50.3	<b>1.2</b>	49.7	51.1	51.2	51.9	<b>1.3</b>	50.9	52.5	52.3	53.2	<b>1.2</b>
<b>Total Demand</b>	<b>95.1</b>	<b>95.6</b>	<b>96.8</b>	<b>97.4</b>	<b>1.6</b>	<b>96.1</b>	<b>96.6</b>	<b>98.1</b>	<b>98.7</b>	<b>1.2</b>	<b>97.2</b>	<b>97.7</b>	<b>99.3</b>	<b>99.9</b>	<b>1.1</b>
<b>Supply</b>															
OPEC Crude	33.3	33.1	33.4	34.0	<b>1.0</b>	33.1	32.6	32.6	32.7	<b>-0.7</b>	32.6	33.0	33.0	33.2	<b>0.2</b>
OPEC Other Liquids	6.5	7.0	7.2	6.9	<b>0.4</b>	6.8	6.7	6.7	6.9	<b>-0.1</b>	6.7	6.8	6.8	6.9	<b>0.0</b>
Non-OPEC Crude & Biofuels & Proc Gain	56.7	55.9	56.3	57.1	<b>-0.8</b>	56.2	57.0	57.9	58.4	<b>0.9</b>	57.8	58.3	59.0	59.3	<b>1.2</b>
<b>Total Supply</b>	<b>96.5</b>	<b>95.9</b>	<b>96.9</b>	<b>98.0</b>	<b>0.6</b>	<b>96.1</b>	<b>96.3</b>	<b>97.2</b>	<b>97.9</b>	<b>0.0</b>	<b>97.1</b>	<b>98.0</b>	<b>98.8</b>	<b>99.5</b>	<b>1.5</b>
<b>Stock Change</b>	1.3	0.3	0.1	0.6		0.0	-0.3	-0.9	-0.8		-0.1	0.3	-0.5	-0.4	
<b>Call on OPEC</b>	31.9	32.8	33.3	33.3	<b>2.0</b>	33.1	32.9	33.5	33.5	<b>0.4</b>	32.7	32.7	33.4	33.6	<b>-0.1</b>

Source: RBC Capital Markets, Petro-Logistics SA, IEA, EIA, JODI, company and government sources

Figure 11: Global Oil Demand (kb/d)

OECD Demand	2016				2017				2018				YoY		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	YoY'16	YoY'17	YoY'18
US	19,775	19,722	20,205	20,075	19,686	19,758	20,282	20,089	19,620	19,732	20,292	20,126	105	10	-11
Canada	2,390	2,373	2,518	2,455	2,450	2,318	2,548	2,477	2,445	2,234	2,628	2,493	28	15	2
Mexico	1,979	1,943	1,933	1,952	1,961	1,895	1,949	1,956	1,949	1,861	1,939	1,949	-55	-11	-16
<b>Total North America</b>	<b>24,144</b>	<b>24,038</b>	<b>24,656</b>	<b>24,482</b>	<b>24,098</b>	<b>23,971</b>	<b>24,779</b>	<b>24,522</b>	<b>24,014</b>	<b>23,827</b>	<b>24,860</b>	<b>24,568</b>	<b>79</b>	<b>13</b>	<b>-26</b>
<b>OECD Europe</b>															
Germany	2,412	2,357	2,424	2,443	2,401	2,280	2,478	2,479	2,399	2,278	2,476	2,477	37	1	-2
UK	1,562	1,611	1,608	1,591	1,555	1,640	1,629	1,590	1,537	1,622	1,630	1,572	48	11	-13
Other Europe	9,690	9,995	10,446	10,198	9,904	10,031	10,302	10,020	9,890	9,971	10,386	9,996	252	-18	-3
<b>Total OECD Europe</b>	<b>13,664</b>	<b>13,963</b>	<b>14,478</b>	<b>14,232</b>	<b>13,861</b>	<b>13,950</b>	<b>14,410</b>	<b>14,089</b>	<b>13,827</b>	<b>13,870</b>	<b>14,493</b>	<b>14,045</b>	<b>337</b>	<b>-7</b>	<b>-19</b>
<b>OECD APAC</b>	<b>8,548</b>	<b>7,644</b>	<b>7,787</b>	<b>8,330</b>	<b>8,490</b>	<b>7,584</b>	<b>7,675</b>	<b>8,194</b>	<b>8,458</b>	<b>7,505</b>	<b>7,600</b>	<b>8,119</b>	<b>39</b>	<b>-92</b>	<b>-65</b>
<b>Total OECD Demand</b>	<b>46,356</b>	<b>45,645</b>	<b>46,921</b>	<b>47,044</b>	<b>46,449</b>	<b>45,505</b>	<b>46,864</b>	<b>46,805</b>	<b>46,299</b>	<b>45,202</b>	<b>46,952</b>	<b>46,732</b>	<b>455</b>	<b>-86</b>	<b>-110</b>
<b>Non-OECD Demand</b>															
<b>South &amp; Central America</b>															
Argentina	750	779	783	764	752	770	745	740	753	752	735	701	0	-17	-17
Brazil	3,024	3,075	3,137	3,074	2,982	3,059	3,108	3,072	2,938	3,058	3,162	3,084	-115	-22	5
Other South & Central America	2,683	2,801	2,849	2,836	2,611	2,846	2,855	2,861	2,652	2,895	2,830	2,871	-7	1	19
<b>South &amp; Central America</b>	<b>6,457</b>	<b>6,655</b>	<b>6,769</b>	<b>6,674</b>	<b>6,344</b>	<b>6,676</b>	<b>6,708</b>	<b>6,673</b>	<b>6,343</b>	<b>6,705</b>	<b>6,727</b>	<b>6,656</b>	<b>-122</b>	<b>-38</b>	<b>7</b>
<b>Middle East</b>															
Iran	1,977	1,917	1,900	1,960	2,058	1,966	1,949	2,086	2,099	2,022	2,003	2,129	-40	76	48
Saudi Arabia	2,951	3,340	3,468	3,080	2,887	3,208	3,373	3,050	2,838	3,250	3,331	3,018	-83	-80	-20
Other MidEast	3,078	3,271	3,476	3,263	2,975	3,309	3,797	3,357	2,957	3,362	3,812	3,339	114	88	8
<b>Middle East</b>	<b>8,006</b>	<b>8,528</b>	<b>8,844</b>	<b>8,303</b>	<b>7,920</b>	<b>8,483</b>	<b>9,120</b>	<b>8,493</b>	<b>7,894</b>	<b>8,634</b>	<b>9,146</b>	<b>8,486</b>	<b>-9</b>	<b>84</b>	<b>36</b>
<b>Emerging APAC</b>															
China	11,771	12,110	11,790	12,022	12,188	12,478	11,959	12,360	12,495	12,815	12,263	12,616	388	323	301
India	4,360	4,319	4,019	4,408	4,432	4,566	4,404	4,707	4,692	4,885	4,602	5,021	286	251	272
Other	8,717	8,782	8,715	9,088	9,284	9,062	9,001	9,524	9,799	9,423	9,276	10,001	336	392	407
<b>Emerging APAC</b>	<b>24,848</b>	<b>25,211</b>	<b>24,524</b>	<b>25,518</b>	<b>25,905</b>	<b>26,106</b>	<b>25,364</b>	<b>26,591</b>	<b>26,985</b>	<b>27,123</b>	<b>26,141</b>	<b>27,637</b>	<b>1,009</b>	<b>966</b>	<b>980</b>
<b>Africa</b>	<b>4,162</b>	<b>4,215</b>	<b>4,093</b>	<b>4,157</b>	<b>4,335</b>	<b>4,436</b>	<b>4,117</b>	<b>4,263</b>	<b>4,367</b>	<b>4,514</b>	<b>4,193</b>	<b>4,343</b>	<b>104</b>	<b>131</b>	<b>66</b>
<b>Non-OECD Europe</b>	<b>675</b>	<b>706</b>	<b>703</b>	<b>697</b>	<b>672</b>	<b>749</b>	<b>733</b>	<b>704</b>	<b>686</b>	<b>790</b>	<b>773</b>	<b>731</b>	<b>20</b>	<b>19</b>	<b>31</b>
<b>FSU</b>	<b>4,642</b>	<b>4,618</b>	<b>4,945</b>	<b>4,988</b>	<b>4,516</b>	<b>4,640</b>	<b>5,191</b>	<b>5,203</b>	<b>4,632</b>	<b>4,778</b>	<b>5,327</b>	<b>5,323</b>	<b>168</b>	<b>89</b>	<b>127</b>
<b>Total Non-OECD Demand</b>	<b>48,790</b>	<b>49,933</b>	<b>49,878</b>	<b>50,337</b>	<b>49,693</b>	<b>51,090</b>	<b>51,233</b>	<b>51,927</b>	<b>50,907</b>	<b>52,543</b>	<b>52,307</b>	<b>53,176</b>	<b>1,170</b>	<b>1,251</b>	<b>1,247</b>
<b>Global Demand</b>	<b>95,146</b>	<b>95,578</b>	<b>96,799</b>	<b>97,381</b>	<b>96,142</b>	<b>96,595</b>	<b>98,098</b>	<b>98,733</b>	<b>97,205</b>	<b>97,746</b>	<b>99,259</b>	<b>99,908</b>	<b>1,624</b>	<b>1,166</b>	<b>1,138</b>

Source: RBC Capital Markets, IEA, EIA, JODI, company and government sources



Figure 12: Global Oil Supply (kb/d)

Non- OPEC Supply	2016				2017				2018				YoY'16	YoY'17	YoY'18
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
US	12,732	12,609	12,297	12,452	12,650	12,993	12,988	13,332	13,548	13,930	13,894	14,200	-470	468	902
Canada	4,609	3,860	4,570	4,822	4,755	4,378	4,803	4,846	5,015	4,654	5,111	5,155	80	230	288
Mexico	2,540	2,489	2,455	2,367	2,373	2,396	2,366	2,373	2,353	2,315	2,295	2,257	-137	-86	-72
<b>Total North America</b>	<b>19,881</b>	<b>18,958</b>	<b>19,322</b>	<b>19,641</b>	<b>19,778</b>	<b>19,767</b>	<b>20,157</b>	<b>20,551</b>	<b>20,916</b>	<b>20,899</b>	<b>21,300</b>	<b>21,612</b>	<b>-527</b>	<b>613</b>	<b>1,119</b>
Argentina	622	608	612	604	602	599	604	606	604	601	612	612	-21	-9	5
Brazil	2,401	2,548	2,729	2,770	2,715	2,787	2,839	2,850	2,795	2,952	3,109	3,140	81	186	201
Colombia	957	907	847	850	858	872	868	884	876	896	827	801	-120	-20	-21
Other South & Central America	380	384	377	377	376	376	412	408	363	356	386	379	-37	14	-22
<b>Total South &amp; Central America</b>	<b>4,360</b>	<b>4,447</b>	<b>4,565</b>	<b>4,601</b>	<b>4,551</b>	<b>4,634</b>	<b>4,723</b>	<b>4,748</b>	<b>4,638</b>	<b>4,805</b>	<b>4,934</b>	<b>4,932</b>	<b>-97</b>	<b>171</b>	<b>163</b>
Norway	2,035	1,935	1,896	2,112	2,037	2,012	1,903	2,034	2,028	2,003	1,973	1,947	47	2	-9
UK	1,094	1,056	975	999	1,019	1,059	949	1,050	1,058	1,064	1,076	1,073	62	-12	49
Other OECD Europe	513	450	472	529	505	478	481	533	469	457	460	472	-68	8	-35
<b>Total OECD Europe</b>	<b>3,642</b>	<b>3,441</b>	<b>3,343</b>	<b>3,640</b>	<b>3,561</b>	<b>3,549</b>	<b>3,333</b>	<b>3,617</b>	<b>3,555</b>	<b>3,524</b>	<b>3,509</b>	<b>3,492</b>	<b>40</b>	<b>-2</b>	<b>5</b>
Azerbaijan	853	857	823	782	796	790	790	803	793	779	748	753	-21	-34	-27
Kazakhstan	1,700	1,589	1,524	1,765	1,799	1,823	1,895	1,933	1,945	1,951	1,954	1,960	-28	218	90
Russia	10,903	10,834	10,893	11,215	11,090	10,953	10,900	10,900	10,900	10,969	11,055	11,067	247	0	37
Other FSU	507	491	574	565	525	533	624	646	622	612	631	667	43	48	51
<b>Total FSU</b>	<b>13,963</b>	<b>13,771</b>	<b>13,814</b>	<b>14,327</b>	<b>14,210</b>	<b>14,099</b>	<b>14,209</b>	<b>14,282</b>	<b>14,260</b>	<b>14,311</b>	<b>14,388</b>	<b>14,447</b>	<b>241</b>	<b>231</b>	<b>152</b>
<b>Non-OPEC Africa</b>	<b>1,876</b>	<b>1,991</b>	<b>1,934</b>	<b>1,949</b>	<b>1,845</b>	<b>1,951</b>	<b>1,942</b>	<b>1,943</b>	<b>1,863</b>	<b>1,921</b>	<b>1,964</b>	<b>1,962</b>	<b>-131</b>	<b>-17</b>	<b>7</b>
<b>Non-OPEC Mideast</b>	<b>1,251</b>	<b>1,253</b>	<b>1,270</b>	<b>1,272</b>	<b>1,226</b>	<b>1,240</b>	<b>1,282</b>	<b>1,295</b>	<b>1,204</b>	<b>1,186</b>	<b>1,206</b>	<b>1,212</b>	<b>-11</b>	<b>-1</b>	<b>-59</b>
China	4,190	4,069	3,955	3,936	3,888	3,923	3,896	3,904	3,840	3,751	3,733	3,745	-303	-135	-136
India	854	846	850	844	847	868	839	823	817	819	807	791	-19	-4	-36
Malaysia	730	712	699	708	697	712	658	664	648	638	661	645	6	-30	-35
Thailand	473	458	458	453	435	457	412	425	443	437	403	405	10	-28	-10
Other Non-OPEC Asia	1,244	1,180	1,190	1,162	1,071	1,072	1,279	1,257	1,177	1,127	1,089	1,147	-69	-24	-35
<b>Total Non-OPEC APAC</b>	<b>7,491</b>	<b>7,265</b>	<b>7,152</b>	<b>7,103</b>	<b>6,938</b>	<b>7,032</b>	<b>7,084</b>	<b>7,073</b>	<b>6,925</b>	<b>6,772</b>	<b>6,693</b>	<b>6,733</b>	<b>-376</b>	<b>-221</b>	<b>-251</b>
<b>Processing Gains</b>	<b>2,267</b>	<b>2,267</b>	<b>2,267</b>	<b>2,267</b>	<b>2,062</b>	<b>2,226</b>	<b>2,352</b>	<b>2,362</b>	<b>2,368</b>	<b>2,534</b>	<b>2,504</b>	<b>2,510</b>	<b>27</b>	<b>-17</b>	<b>229</b>
<b>Global Biofuels</b>	<b>1,933</b>	<b>2,475</b>	<b>2,671</b>	<b>2,325</b>	<b>2,029</b>	<b>2,470</b>	<b>2,820</b>	<b>2,483</b>	<b>2,035</b>	<b>2,315</b>	<b>2,478</b>	<b>2,448</b>	<b>66</b>	<b>100</b>	<b>-132</b>
<b>Total Non-OPEC Supply</b>	<b>56,664</b>	<b>55,868</b>	<b>56,338</b>	<b>57,125</b>	<b>56,200</b>	<b>56,968</b>	<b>57,902</b>	<b>58,354</b>	<b>57,764</b>	<b>58,267</b>	<b>58,976</b>	<b>59,348</b>	<b>-767</b>	<b>857</b>	<b>1,233</b>
<b>Global Supply</b>	<b>96,489</b>	<b>95,911</b>	<b>96,913</b>	<b>98,017</b>	<b>96,099</b>	<b>96,257</b>	<b>97,243</b>	<b>97,912</b>	<b>97,125</b>	<b>98,045</b>	<b>98,774</b>	<b>99,463</b>	<b>628</b>	<b>45</b>	<b>1,474</b>
OPEC Supply	2016				2017				2018				YoY'16	YoY'17	YoY'18
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
Algeria	1,052	1,106	1,096	1,174	1,067	1,109	1,039	1,046	1,033	1,062	1,088	1,123	37	-42	11
Angola	1,814	1,767	1,769	1,679	1,631	1,664	1,673	1,669	1,661	1,681	1,701	1,721	-39	-98	32
Indonesia	742	755	755	755	755	755	745	750	755	755	745	750	35	0	0
Iran	3,123	3,639	3,668	3,839	3,820	3,641	3,669	3,685	3,790	3,810	3,669	3,685	706	136	35
Iraq	4,336	4,322	4,394	4,708	4,499	4,397	4,351	4,374	4,348	4,468	4,523	4,643	397	-35	90
Kuwait*	2,917	2,777	2,948	2,848	2,750	2,759	2,713	2,736	2,709	2,819	2,871	2,963	51	-133	101
Libya	317	305	322	562	672	634	613	648	610	590	570	550	3	265	-62
Nigeria	1,709	1,411	1,230	1,349	1,348	1,394	1,384	1,389	1,379	1,369	1,359	1,349	-329	-46	-15
Qatar	649	645	604	649	626	602	617	620	615	626	620	632	-2	-21	7
Saudi Arabia*	10,565	10,322	10,525	10,249	9,851	9,908	10,017	10,052	10,035	10,093	10,111	10,133	321	-458	136
UAE	2,787	2,850	3,007	3,106	3,029	2,839	2,888	2,863	2,869	2,887	2,895	2,901	83	-33	-17
Venezuela	2,534	2,407	2,329	2,287	2,244	2,182	2,154	2,139	2,109	2,081	2,053	2,015	-267	-209	-115
Ecuador	535	540	546	533	559	499	530	515	522	525	530	515	-6	-13	-3
Gabon	200	241	212	243	199	210	219	215	215	210	219	215	-6	-13	4
<b>OPEC Crude Total</b>	<b>33,279</b>	<b>33,086</b>	<b>33,403</b>	<b>33,981</b>	<b>33,050</b>	<b>32,591</b>	<b>32,611</b>	<b>32,699</b>	<b>32,648</b>	<b>32,974</b>	<b>32,952</b>	<b>33,192</b>	<b>985</b>	<b>-700</b>	<b>204</b>
<b>OPEC Other Liquids</b>	<b>6,546</b>	<b>6,957</b>	<b>7,172</b>	<b>6,911</b>	<b>6,849</b>	<b>6,698</b>	<b>6,730</b>	<b>6,860</b>	<b>6,713</b>	<b>6,803</b>	<b>6,846</b>	<b>6,923</b>	<b>410</b>	<b>-112</b>	<b>37</b>
* Includes Neutral Zone															

Source: RBC Capital Markets, Petro-Logistics SA, IEA, EIA, JODI, company and government sources





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