

## ARC Energy Charts

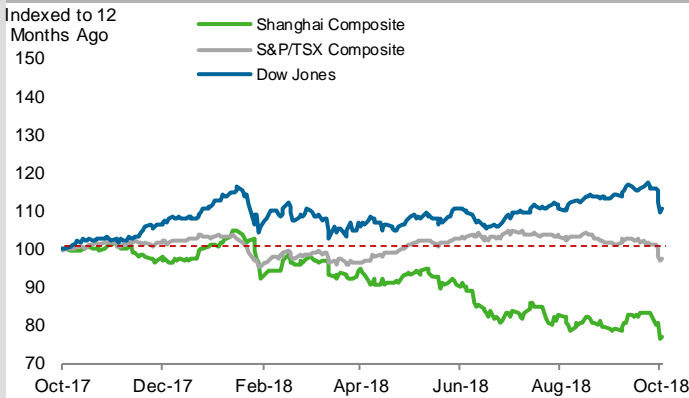
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### Chart Watch

- 1 Global markets fell sharply last week
- 7 Canadian oil price diffs are hitting record highs
- 10 US crude oil production hit a record high in July
- 11 Alberta oil production rose in August - AER
- 13 The IEA lowered 2019 demand growth forecast

Spot WTI Crude \$US/B	Edmonton Light \$US/B	Spot Henry Hub \$US/MMBtu	Spot AECO \$Cdn/GJ	Spot AECO Basis \$US/MMBtu	Currency \$US/\$Cdn
71.34 ↓	44.20 ↓	3.18 ↓	1.60 ↓	1.88 ↑	0.7678 ↓

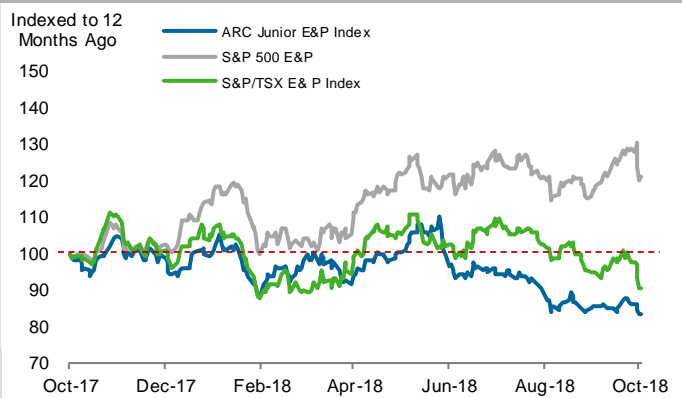
### 1 Broad Equity Markets Year-to-Date Daily Index Values; Rolling 12-Month History



Broad market indices are one of the many vital signs measuring the health of the economy. Energy demand is a function of economic health.

Source: Bloomberg, ARC Financial Corp.

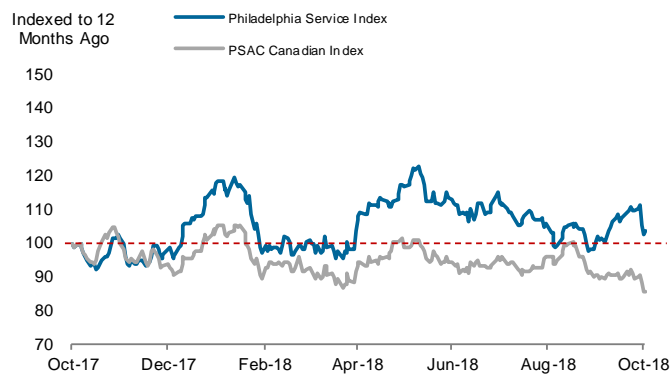
### 2 Performance of Oil and Gas Equities Year-to-Date Daily Index Values; Rolling 12-Month History



Performance of Canadian and US oil & gas equities are compared against each other.

Source: Bloomberg, ARC Financial Corp.

### 3 Oil & Gas Service Equities Year-to-Date Daily Index Values; Rolling 12-Month History



The performance of Canadian oil and gas service equities are plotted in tandem with the corresponding US index.

Source: Bloomberg, Petroleum Services Association of Canada

### 4 Canadian Currency Exchange Daily Close Values; Rolling 24-Month History



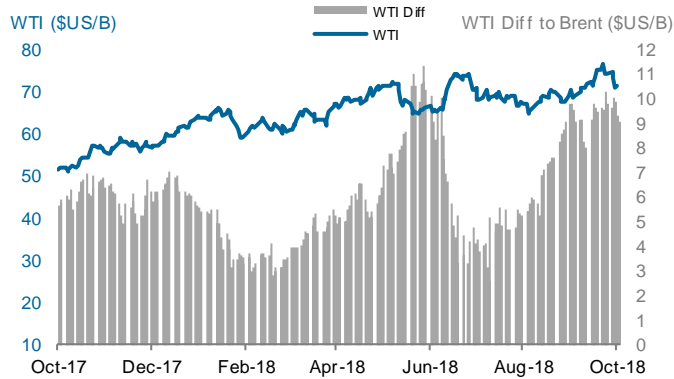
Much of Canada's oil and gas production is sold in US dollars. As such, the exchange rate significantly impacts corporate revenues and profits.

Source: Bloomberg

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### 5 WTI Crude Oil Price and Differential to Brent

Near-Month WTI and Brent Differential; Rolling 12-Month History

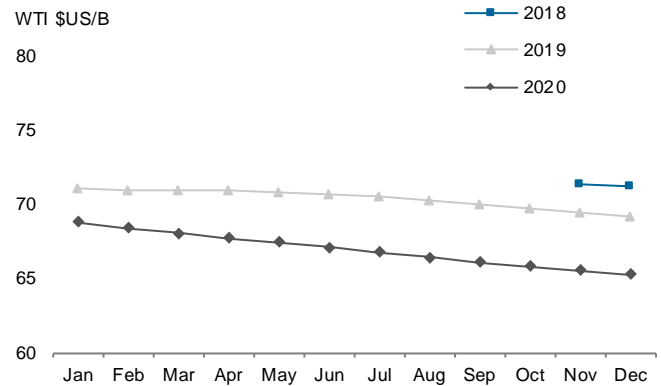


North American crude oil prices can sometimes disconnect from global prices depending on regional supply and demand dynamics.

Source: Bloomberg

### 6 US Crude Oil Futures

West Texas Intermediate (WTI) 2018 to 2020

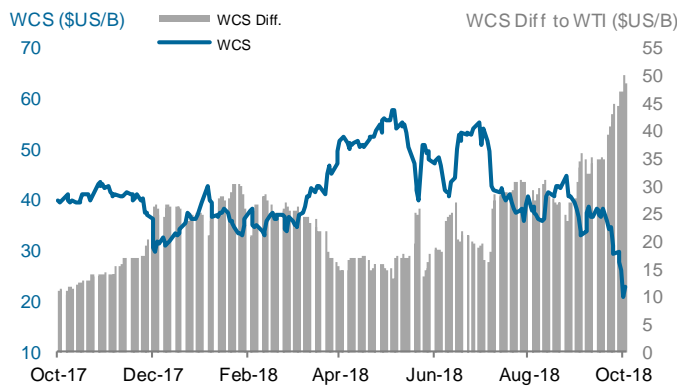


Forward prices for WTI are plotted against months in the calendar year. Years are distinguished by color and symbol coding.

Source: Bloomberg

### 7 Canadian Heavy Oil Price Differential to WTI

Western Canadian Select (WCS) Differential; Rolling 12-Month History

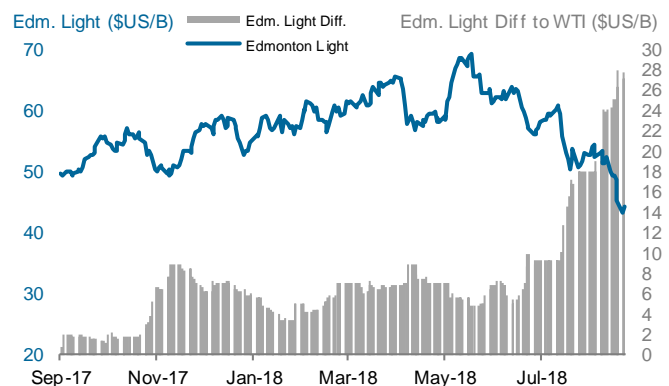


The differential should reflect quality differences and transportation costs. Greater discounts can result from infrastructure or refinery outages.

Source: Bloomberg

### 8 Canadian Light Crude Oil Price Differential to WTI

WTI and Edmonton Light differential; Rolling 12-Month History

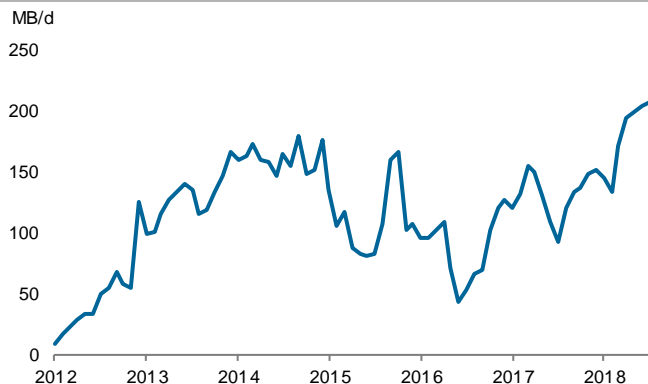


The differential should reflect the transportation cost from Alberta to Cushing. Greater discounts can result from infrastructure or refinery outages.

Source: Bloomberg

### 9 Canadian Crude Oil Exports by Rail

Monthly; 2012 to Present

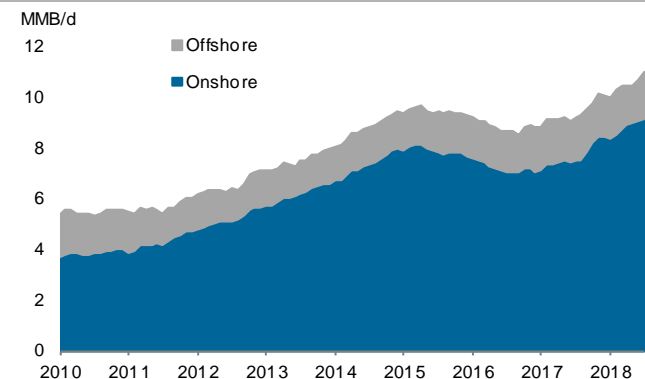


Rail is expected to grow as the pipelines have hit the limit for moving additional barrels of crude oil, and supply is still growing.

Source: National Energy Board

### 10 Total US Oil Production

Monthly; 2010 to Present

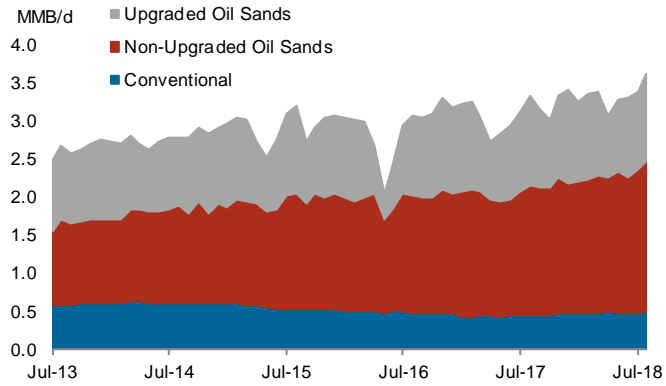


The advancement of drilling and completion methods is increasing US crude oil production.

Source: Bloomberg, U.S. Energy Information Administration

### 11 Alberta Oil Production

Monthly; Conventional and Oil Sands

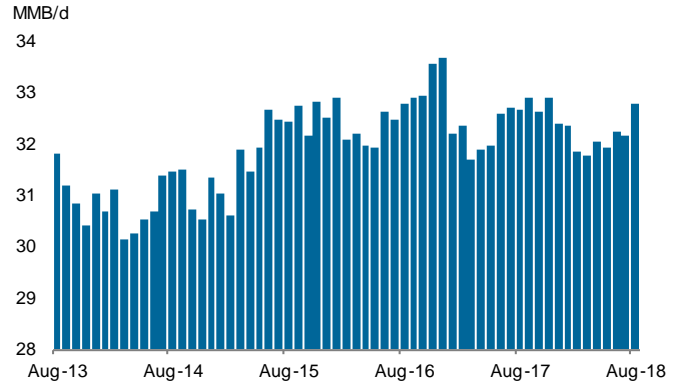


Most of Canada's oil production comes from Alberta; split between oil sands and conventional production.

Source: Alberta Energy Regulator

### 12 OPEC Oil Production

Monthly; Rolling 60-Month History

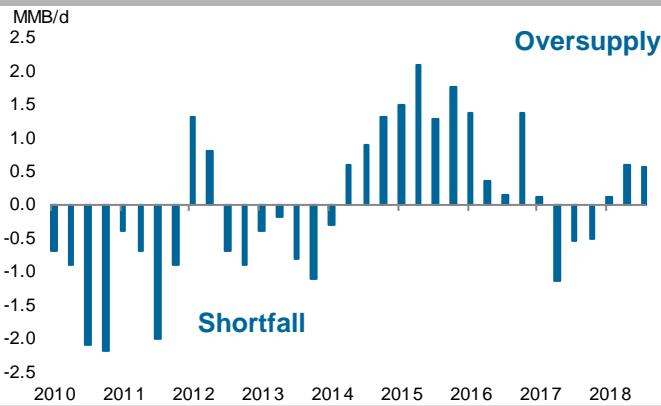


OPEC's production levels relative to its sustainable and spare capacity influences global crude prices.

Source: Petroleum Intelligence Weekly

### 13 Global Oil Supply-Demand Balance

Quarterly; 2010 to Present

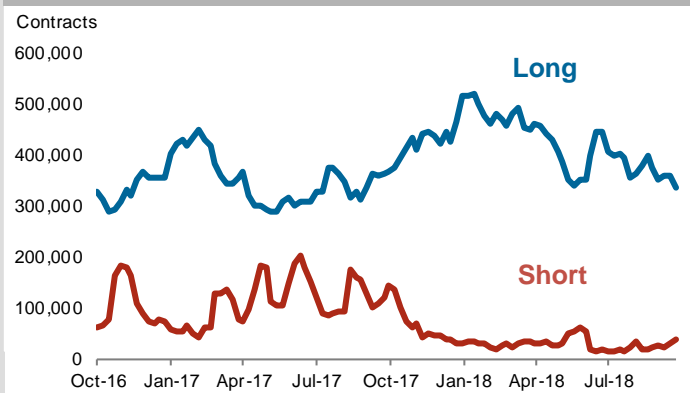


Negative numbers indicate a global crude shortfall, while positive numbers indicate an oversupply.

Source: International Energy Agency

### 14 Long and Short Contracts - WTI

Managed Money - Futures

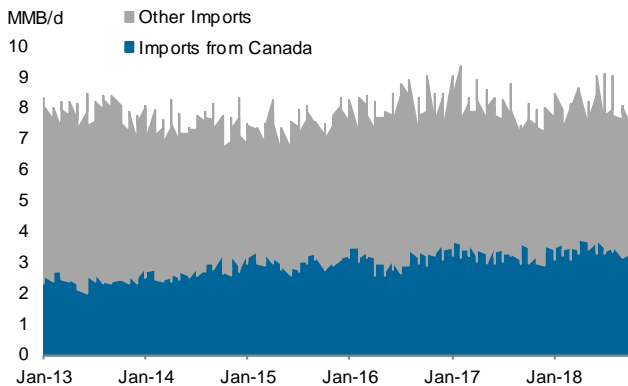


Long contracts take the position that WTI oil price will increase, while short contracts expect a decline.

Source: Bloomberg, U.S. Commodity Futures Trading Commission

### 15 US Crude Oil Imports

Weekly Data; 2013 to Present

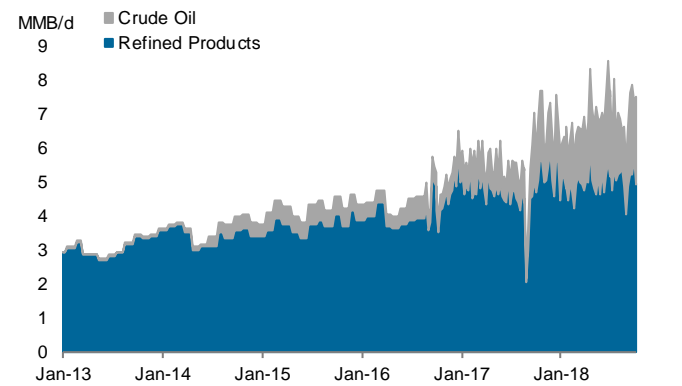


Crude oil imports from Canada are taking market share from overseas imports.

Source: U.S. Energy Information Administration

### 16 US Exports of Crude Oil and Refined Products

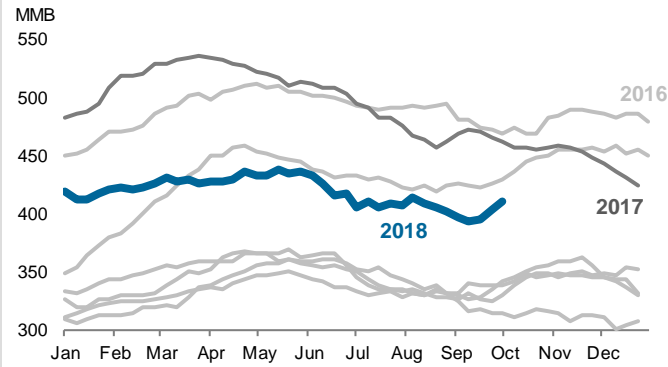
Weekly Data; 2013 to Present



The US exports more refined products than crude oil. With the rapid growth of tight oil, most export growth should come from crude oil exports.

Source: U.S. Energy Information Administration

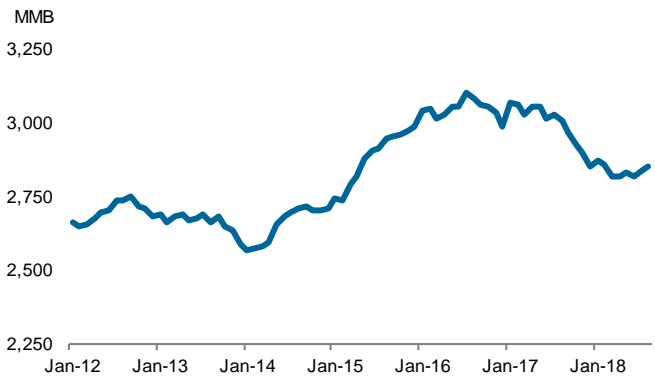
**17 US Crude Oil Stocks**  
Historical Tracks and Current Year Levels



US crude oil stock levels can affect crude oil prices. Stock levels for the current year are represented by the blue line.

Source: U.S. Energy Information Administration

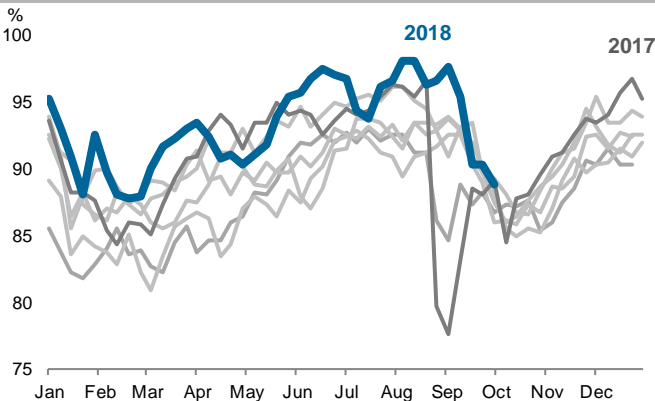
**18 OECD Total Industry Oil Stocks**  
Monthly; 2012 to Present



OECD stock levels can affect crude oil prices.

Source: International Energy Agency

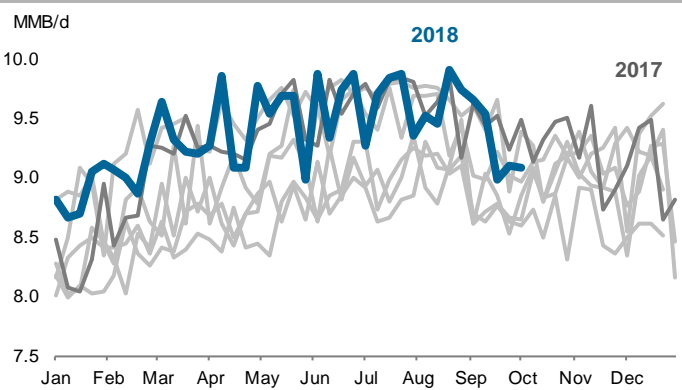
**19 US Weekly Refinery Utilization Rates (%)**  
Historical Tracks and Current Year Levels



Refinery utilization rates change the supply of refined products, impacting price. Utilization for the current year is blue.

Source: U.S. Energy Information Administration

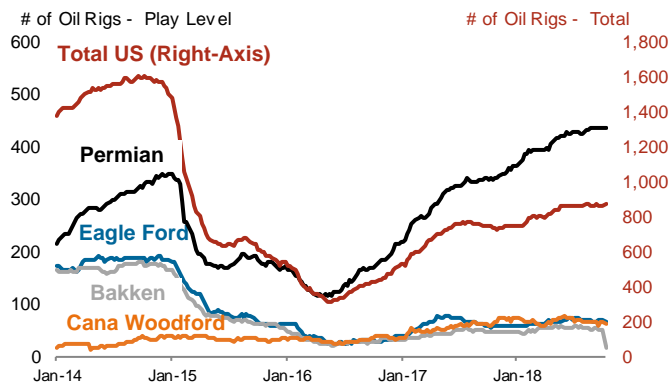
**20 US Motor Gasoline Consumption**  
Historical Tracks and Current Year Levels



Gasoline consumption accounts for almost half of all oil use in the US. Gasoline consumption for the current year is represented by the blue line.

Source: U.S. Energy Information Administration

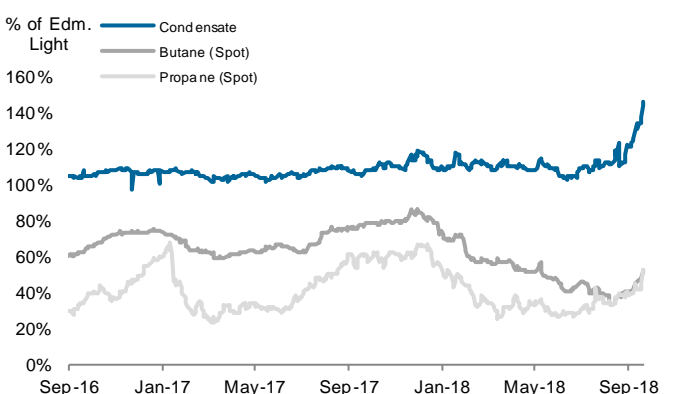
**21 US Oil Drilling Activity**  
Baker Hughes Horizontal Oil Rig Counts; 2014 to Present



Tracking US oil drilling by major play provides insight into the composition of US oil supply and growth trends.

Source: Baker Hughes

**22 Daily NGL Prices as a % of Edmonton Light**  
Propane & Butane Spot Prices at Edmonton, AB

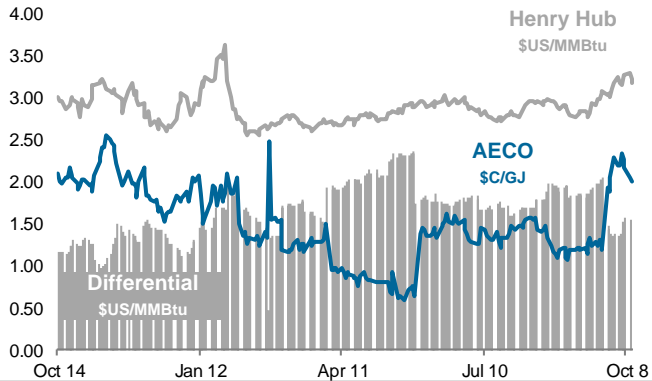


Natural gas liquids have become critical contributors to producer's cash flow. Prices are influenced by the price of oil as well as local supply and demand.

Source: Bloomberg, ARC Financial Corp.

#### 23 Near-Month North American Natural Gas Prices

Daily Prices; Rolling 12-Month History

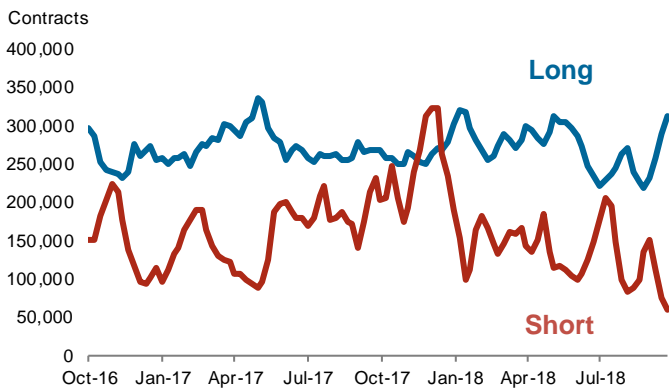


Near-month prices at AECO track Henry Hub prices, the exchange rate and the cost of transportation. Local factors can also affect price.

Source: Bloomberg

#### 25 Long and Short Contracts – Henry Hub

Managed Money - Futures

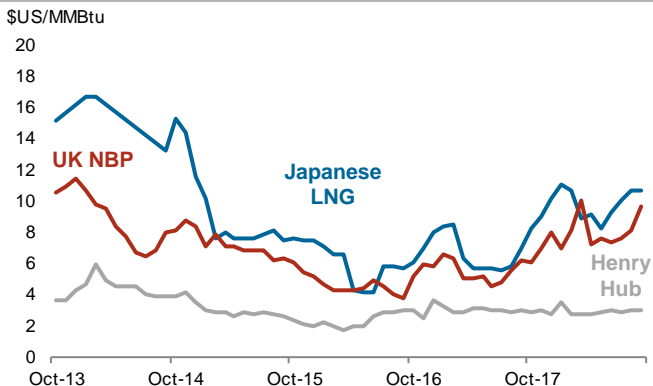


Long contracts take the position that Henry Hub gas price will increase, while short contracts expect a decline.

Source: U.S. Commodity Futures Trading Commission

#### 27 Global Natural Gas Prices

Japanese LNG, UK NBP, Henry Hub; Average Monthly Prices

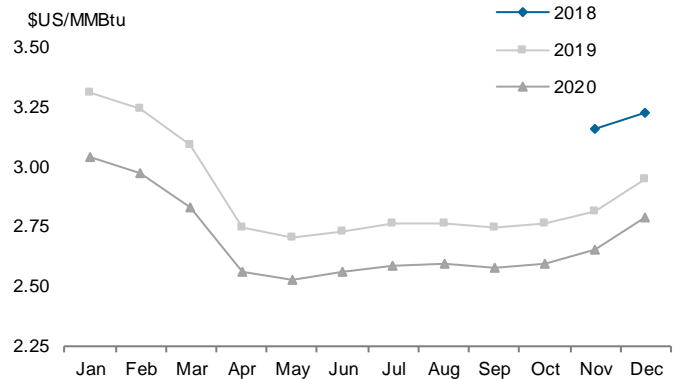


International natural gas prices strongly impact the economics of proposed LNG projects.

Source: Bloomberg, Japanese Ministry of Economy, Trade and Industry

#### 24 US Natural Gas Futures

Nymex (Henry Hub) 2018 to 2020

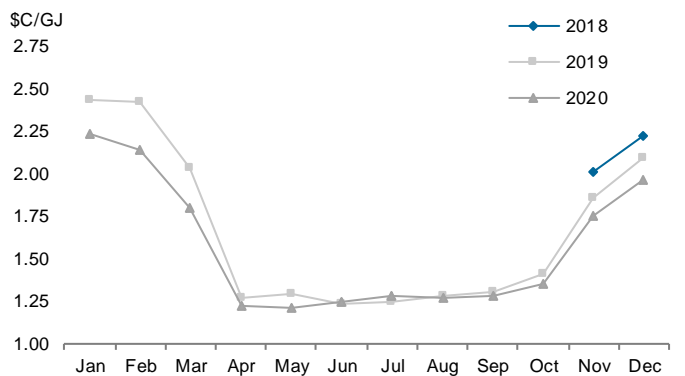


Forward contract prices are plotted against months in the calendar year. Years are distinguished by color and symbol coding.

Source: Bloomberg

#### 26 Canadian Natural Gas Futures

AECO Hub (Bloomberg Estimate) 2018 to 2020

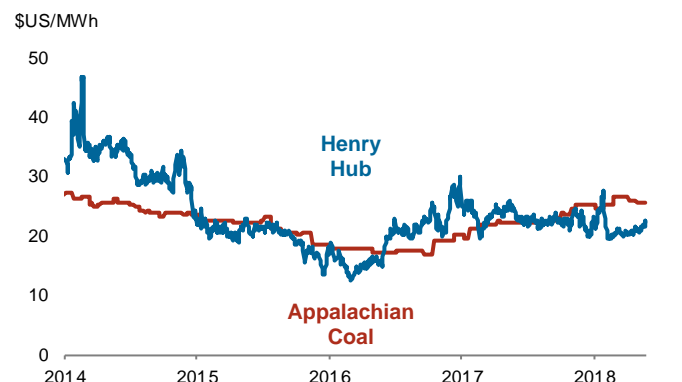


AECO forward prices mimic Henry Hub futures minus a differential.

Source: Bloomberg

#### 28 US Coal and Natural Gas Power Generation Cost

Converted to a \$/MWh Equivalent

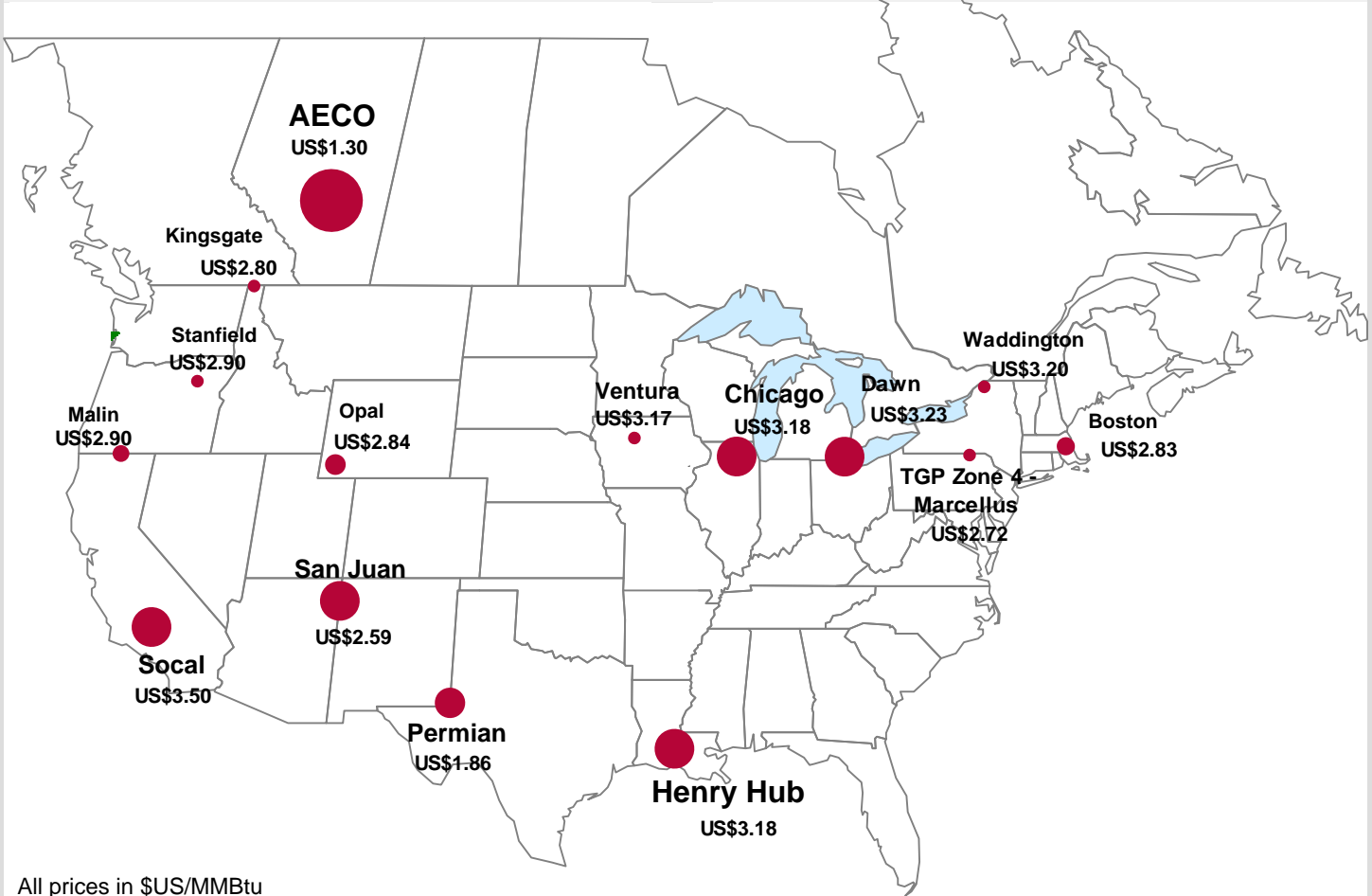


This graph illustrates when it may be economic to begin coal-gas switching in power generation. Average power plant efficiencies are assumed.

Source: Bloomberg

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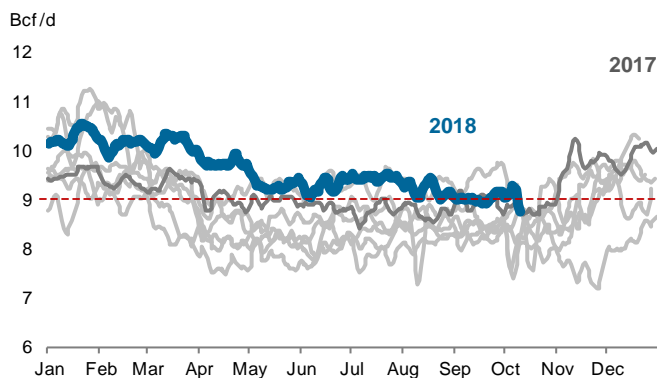
### Closing Spot Prices at North American Natural Gas Hubs Superimposed on Relative Physical Volumes Traded



All prices in \$US/MMBtu

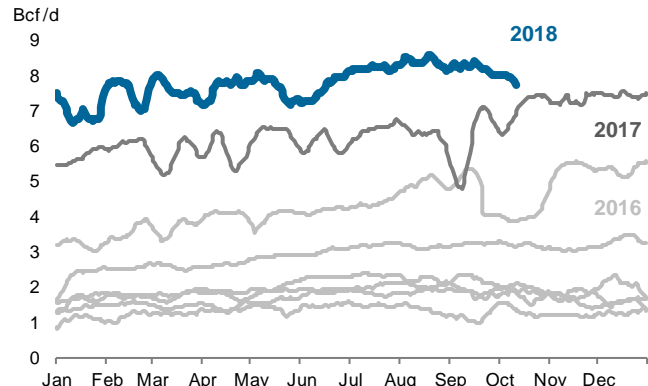
North America has an integrated natural gas market. Prices are determined by regional supply and demand, and pipeline flows.  
Source: Bloomberg

### 30 Pipeline Flows Out of Western Canada Daily; Historical Tracks and Current Year Levels



The ability of gas producers to move gas out of the WCSB to eastern markets and the US is a major factor in local natural gas prices.  
Source: Various Pipeline Companies

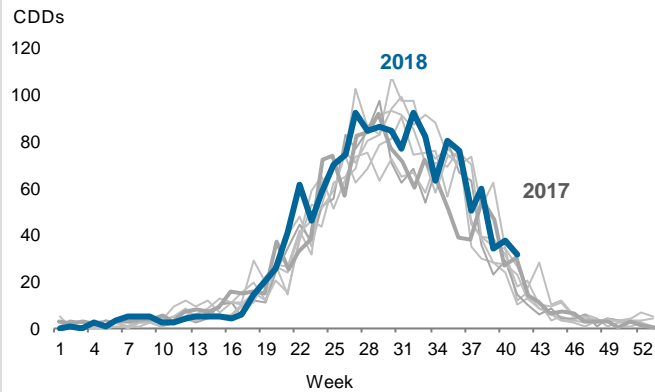
### 31 US Natural Gas Exports – Excluding Canada Daily; Historical Tracks and Current Year Levels



Between exports to Mexico and LNG shipments, the US is growing as a natural gas exporter. Robust US supply growth has driven this trend.  
Source: Bentek

#### 32 US Weekly Cooling Degree Days

Source: NOAA

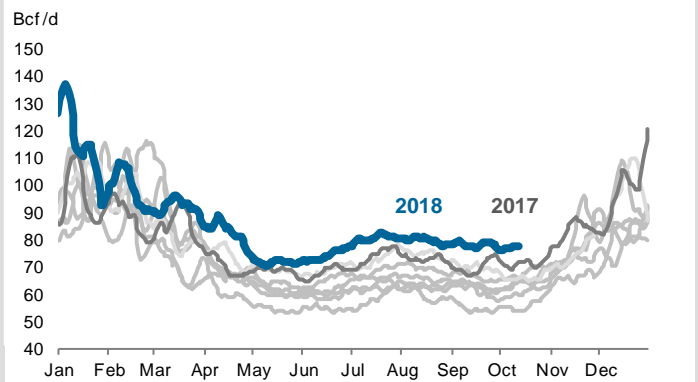


Weekly natural gas demand is directly tied to the weather. The current year is in dark blue.

Source: National Oceanic and Atmospheric Administration

#### 33 US Total Natural Gas Demand

Daily; Historical Tracks and Current Year Levels

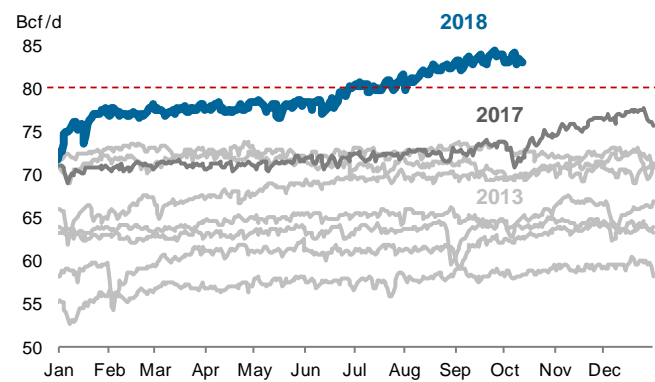


Total US demand fluctuates in the summer and during the winter as weather is an important driver of consumption.

Source: Bentek

#### 34 Total US Dry Natural Gas Production

Historical Tracks and Current Year Levels

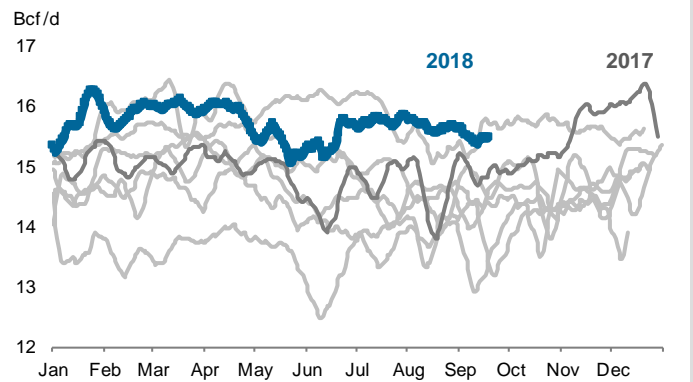


US production started ramping up in late 2007 and continues to grow year over year.

Source: Bentek

#### 35 Daily Western Canadian Production

Estimated Using Major Pipeline Receipts

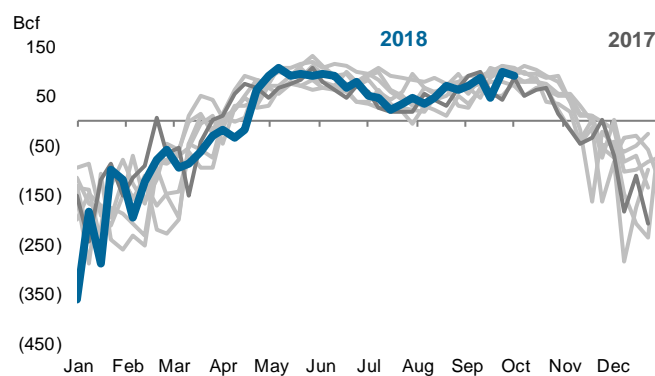


This includes receipts on the TCPL, Alliance, WestCoast and TransGas pipelines.

Source: Various Pipeline Companies

#### 36 Weekly US Natural Gas Storage Net Change

Weekly Injection or (Withdrawals); 2009 to Current

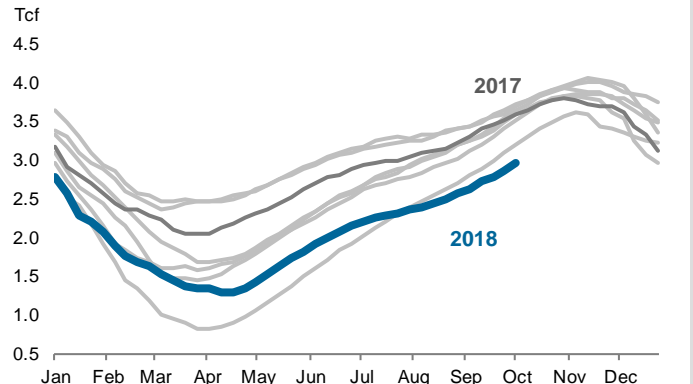


Weekly gas storage reports provide a snapshot of supply and demand. Current year changes are represented by the blue line.

Source: U.S. Energy Information Administration

#### 37 Total Working Natural Gas in US Storage

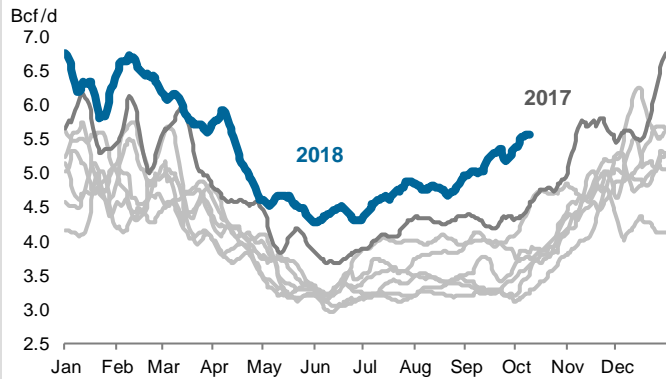
Historical Tracks and Current Year Levels



The EIA reports changes in US natural gas inventories held in underground storage facilities on a weekly basis.

Source: U.S. Energy Information Administration

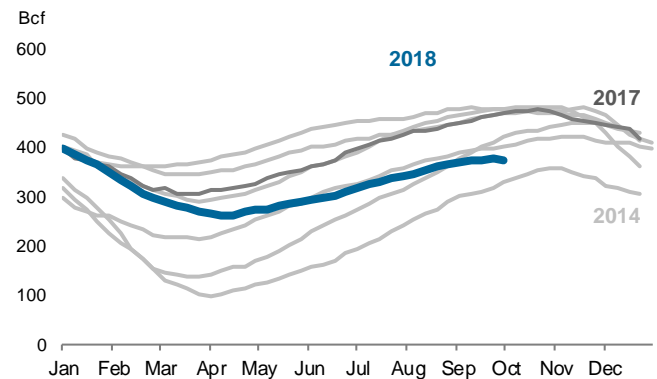
**38 Alberta Natural Gas Demand**  
TransCanada Intra-AB Deliveries; Current Year and Historical Tracks



Alberta natural gas demand has grown steadily in recent years, largely driven by new oil sands demand and power generation projects.

Source: TransCanada Pipelines

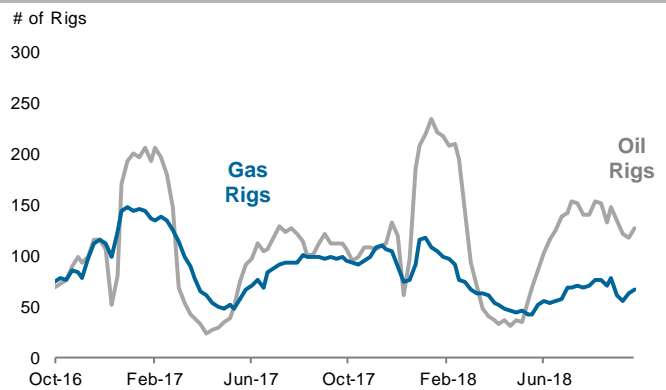
**39 Western Canadian Natural Gas Storage Levels**  
Weekly; Current Year and Historic Tracks



Canada's natural gas storage level provides a good metric if the country is well stocked. Abnormally high or low storage can affect the basis.

Source: Bloomberg

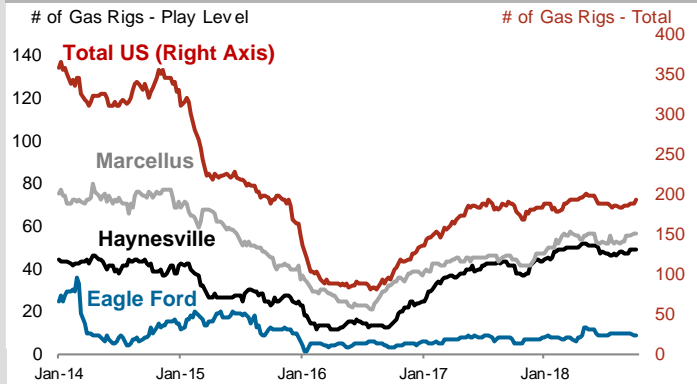
**40 Weekly Canadian Oil and Gas Drilling Activity**  
Baker Hughes Average Rig Counts; Rolling 24-Month History



Unlike US drilling activity, Canadian rigs are dispatched seasonally. Capital allocation by operators is driven by views of future oil and gas prices.

Source: Baker Hughes

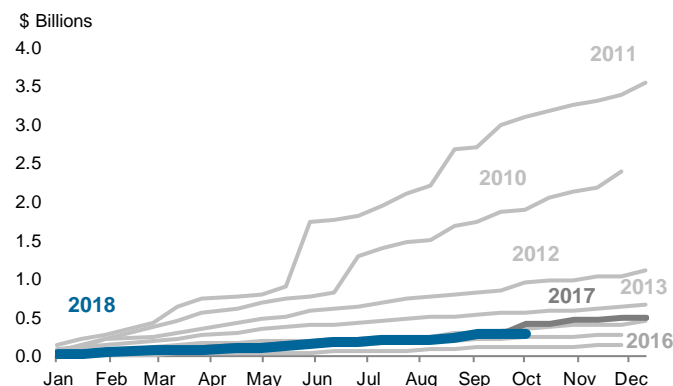
**41 US Gas Drilling Activity**  
Baker Hughes Horizontal Gas Rig Counts; 2014 to Present



Tracking US gas drilling by major play provides insight into the composition of US gas supply and growth trends.

Source: Baker Hughes

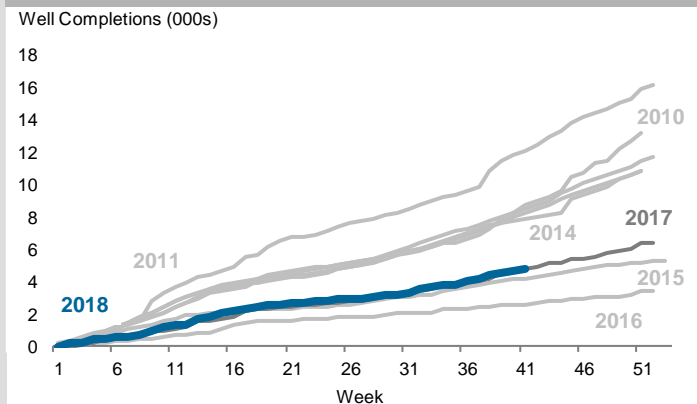
**42 Alberta Crown Land Sales – Excluding Oil Sands**  
Year-over-Year; Cumulative



Land prices are an important component of F&D costs. In Alberta, sales of petroleum and natural gas rights are held every two weeks.

Source: Alberta Department of Energy

**43 Canadian Cumulative Well Completions**  
Current Year vs Years Prior



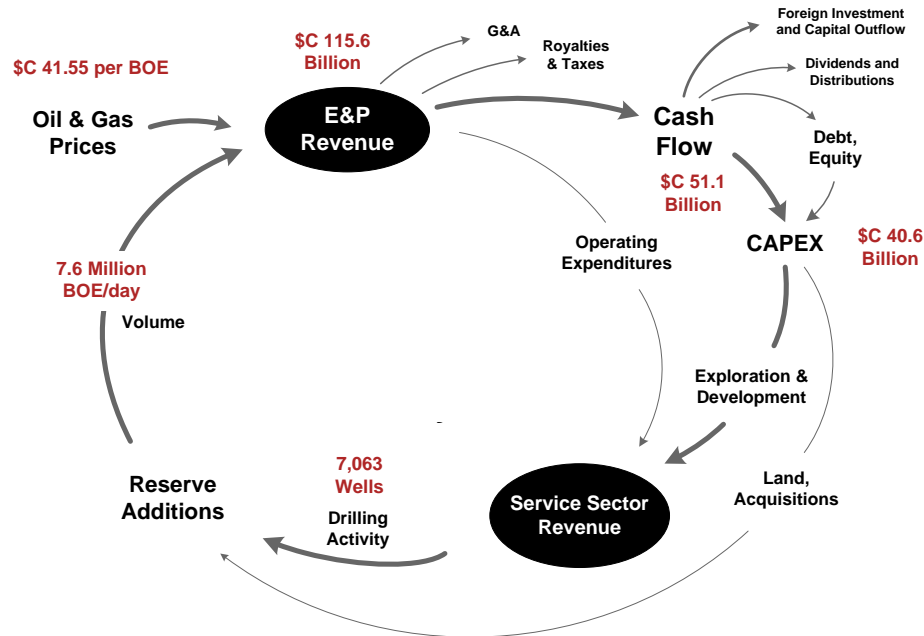
Relative year-over-year drilling activity is highlighted in this chart. Cumulative well completions for the current year are shown in blue.

Source: Daily Oil Bulletin/JWN



### Estimated Capital Flow in the Canadian Oil and Gas Economy for 2018

Industry Revenue, Cash Flow, Reinvestment, Drilling Activity and Production



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### Canadian Industry Statistics: Historical Data and Forecast

#### Canadian Industry Metrics

	Price			Production Volume				Capital Inflow		Reinvestment			Drilling		Well Split	
	Average Price	Edmonton Par	AECO	Conv. Liquids	Bitumen + Synthetic	Natural Gas	Total Volume	Total Revenue	After-tax Cash Flow	Conv. Oil and Gas	Oilsands	Reinvest Ratio	Wells Compl.	Avg Rig Utiliz.	Oil Wells	Gas Wells
	\$/BOE	\$/B	\$/GJ	Average MBOE/d	Average MBOE/d	MBOE/d (@ 6:1)	MBOE/d (@ 6:1)	\$/ millions	\$/ millions	\$/ millions	\$/ millions	x:1	#/ Year	%	%	%
<b>2009</b>	42.26	66.42	3.79	1,840	1,331	2,544	5,683	89,057	36,680	22,335	11,227	0.91	8,368	25%	41%	51%
<b>2010</b>	48.41	77.55	3.79	1,830	1,403	2,434	5,668	101,056	43,569	35,666	17,195	1.16	12,119	40%	56%	40%
<b>2011</b>	55.32	95.24	3.44	1,873	1,482	2,386	5,740	115,890	53,448	40,139	22,491	1.10	12,827	52%	69%	31%
<b>2012</b>	50.60	86.38	2.27	1,905	1,743	2,327	5,975	111,389	48,908	39,733	27,199	1.37	11,067	44%	83%	17%
<b>2013</b>	55.95	93.47	3.02	2,023	1,940	2,343	6,306	128,787	54,711	43,165	30,809	1.35	11,071	42%	84%	16%
<b>2014</b>	61.31	95.07	4.23	2,085	2,160	2,449	6,694	149,801	72,117	46,872	33,868	1.12	11,222	45%	78%	22%
<b>2015</b>	37.22	57.63	2.56	1,983	2,368	2,497	6,848	93,019	28,877	31,609	22,929	1.89	5,382	24%	69%	31%
<b>2016</b>	32.56	53.09	2.06	2,011	2,418	2,538	6,967	82,798	23,201	23,040	15,426	1.66	4,060	17%	70%	30%
<b>2017e</b>	39.11	62.42	2.10	2,096	2,670	2,580	7,347	104,870	42,614	28,712	13,803	1.00	7,076	24%	70%	30%
<b>2018e</b>	41.55	74.52	1.50	2,033	2,984	2,603	7,620	115,554	51,122	28,073	12,519	0.79	7,063	24%	70%	30%

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