

ARC Energy Charts

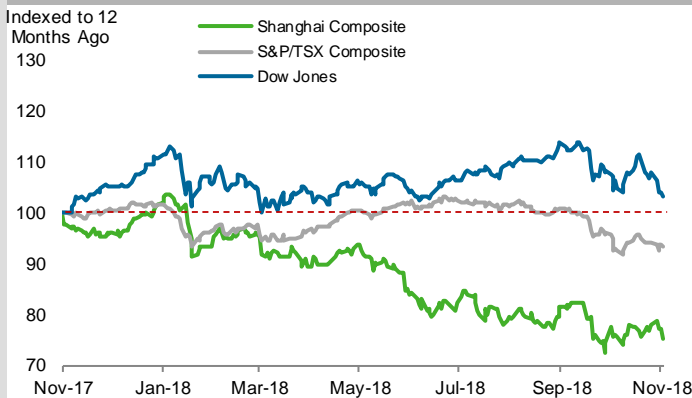
Visit www.arcenergyinstitute.com for more information on this publication and the Institute

Chart Watch

- 5 WTI fell by \$6.24/B over the week
- 9 Canadian rail exports hit a record high in Sept
- 30 Gas exports remain lower on T-South restriction
- 34 US gas production hit a new record high
- 36 US gas inventories had a surprisingly large draw

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
50.22 ↓	23.39 ↓	4.70 ↑	1.08 ↓	3.84 ↑	0.7557 ↓

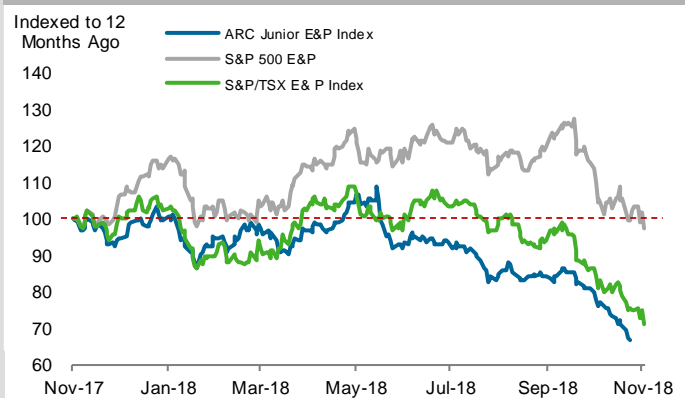
1 Broad Equity Markets Year-to-Date Daily Index Values; Rolling 12-Month History



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.

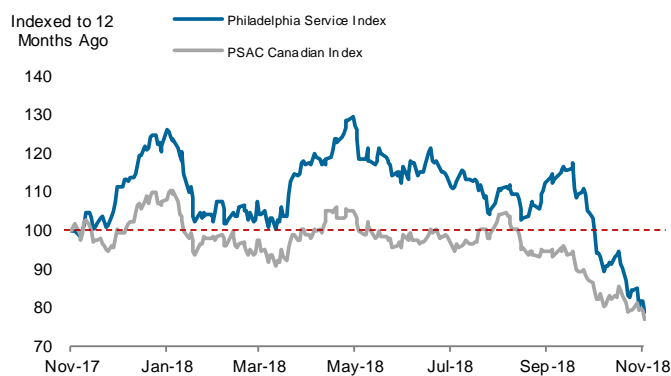
2 Performance of Oil and Gas Equities Year-to-Date Daily Index Values; Rolling 12-Month History



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

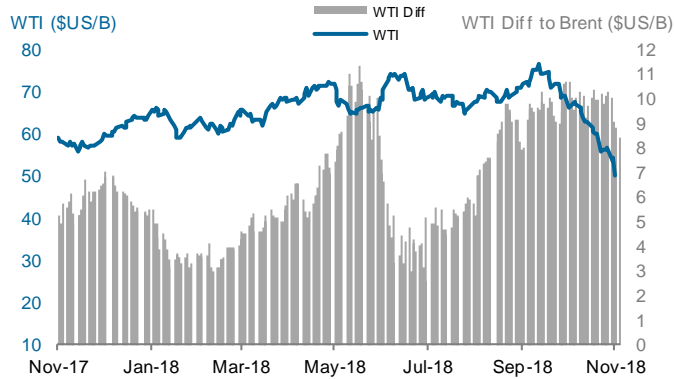


Much of Canada's oil and gas production is sold in US dollars. As such, the exchange rate significantly impacts corporate revenues and profits.

Source: Bloomberg

Please see **Advisories and Disclaimers** at the end of the publication for important cautionary advisory and disclaimer language

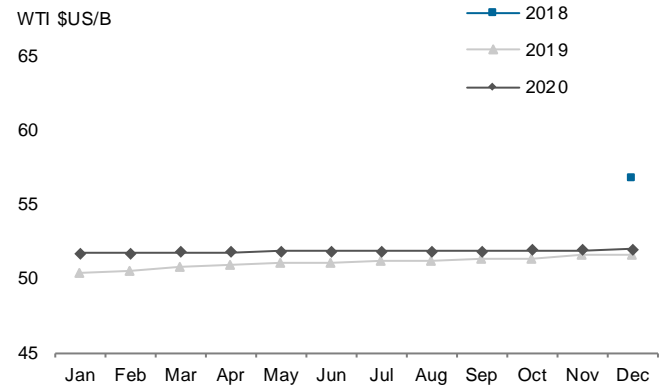
5 WTI Crude Oil Price and Differential to Brent Near-Month WTI and Brent Differential; Rolling 12-Month History



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

Source: Bloomberg

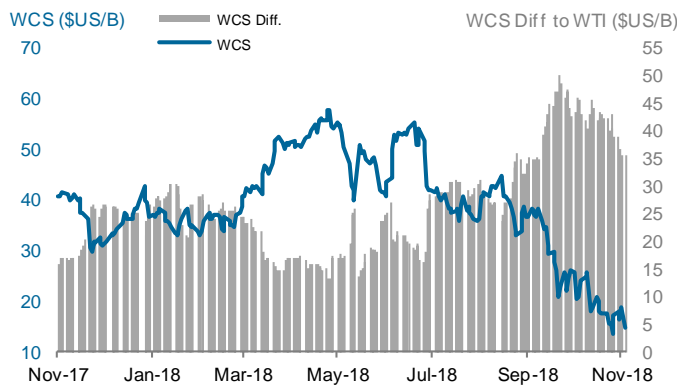
6 US Crude Oil Futures West Texas Intermediate (WTI) 2018 to 2020



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

Source: Bloomberg

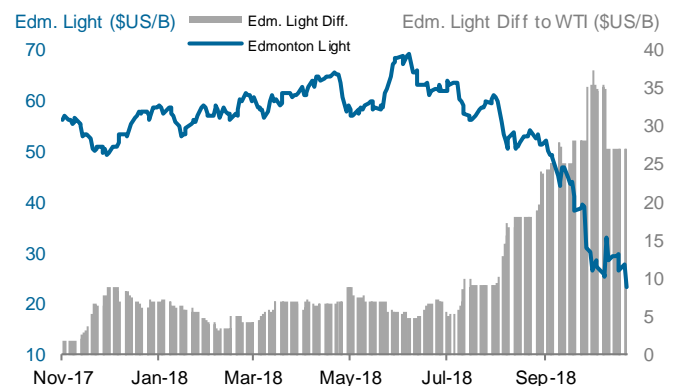
7 Canadian Heavy Oil Price Differential to WTI Western Canadian Select (WCS) Differential; Rolling 12-Month History



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

Source: Bloomberg

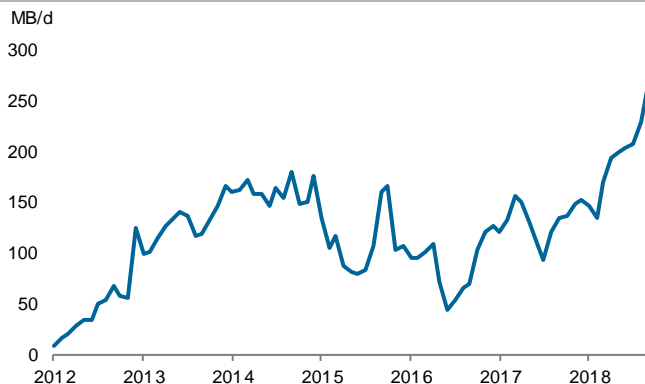
8 Canadian Light Crude Oil Price Differential to WTI WTI and Edmonton Light differential; Rolling 12-Month History



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

Source: Bloomberg

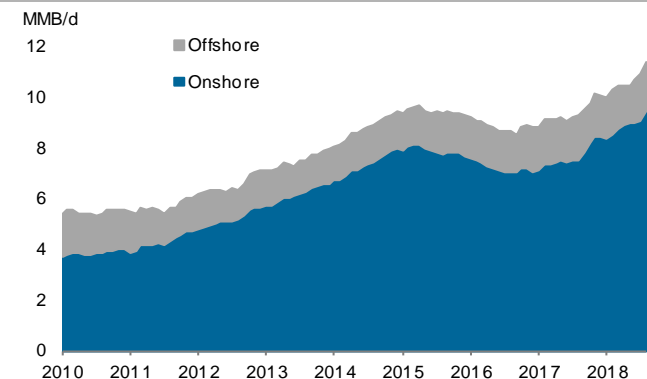
9 Canadian Crude Oil Exports by Rail Monthly; 2012 to Present



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

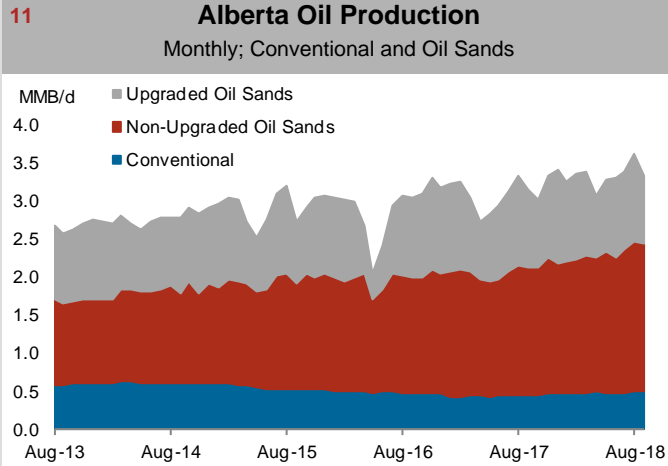
Source: National Energy Board

10 Total US Oil Production Monthly; 2010 to Present



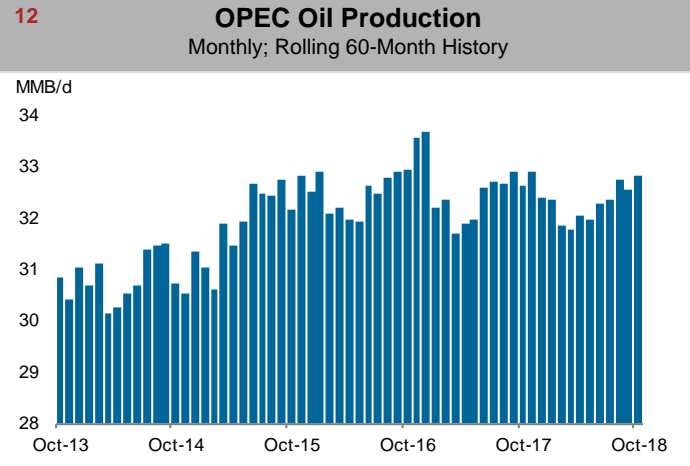
The advancement of drilling and completion methods is increasing US crude oil production.

Source: Bloomberg, U.S. Energy Information Administration



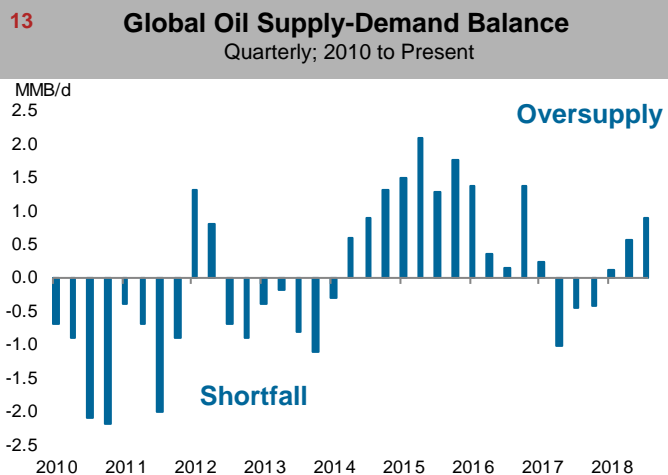
Most of Canada's oil production comes from Alberta; split between oil sands and conventional production.

Source: Alberta Energy Regulator



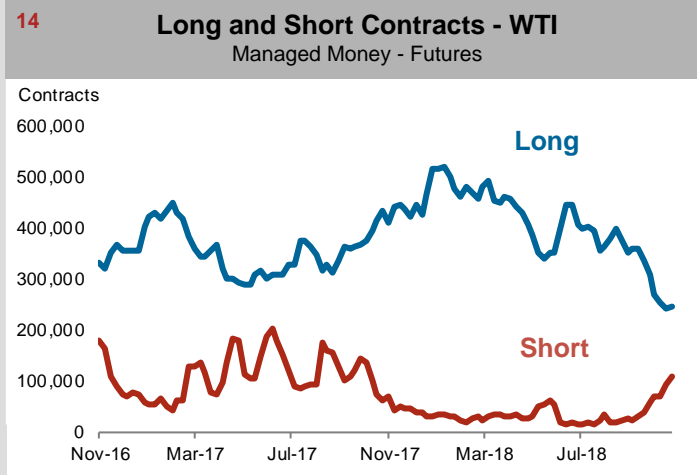
OPEC's production levels relative to its sustainable and spare capacity influences global crude prices.

Source: Petroleum Intelligence Weekly



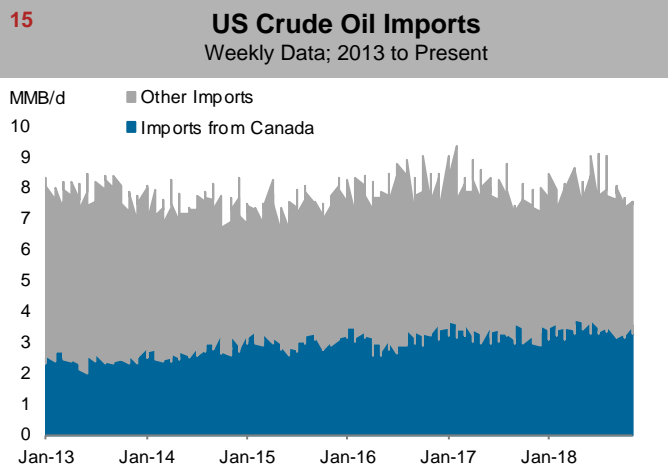
Negative numbers indicate a global crude shortfall, while positive numbers indicate an oversupply.

Source: International Energy Agency



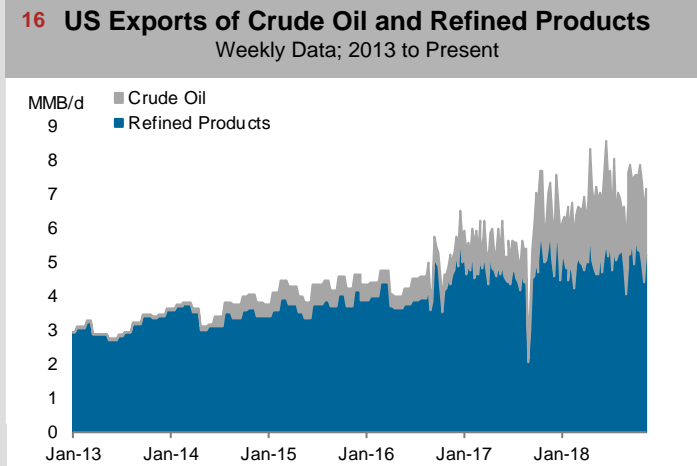
Long contracts take the position that WTI oil price will increase, while short contracts expect a decline.

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



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

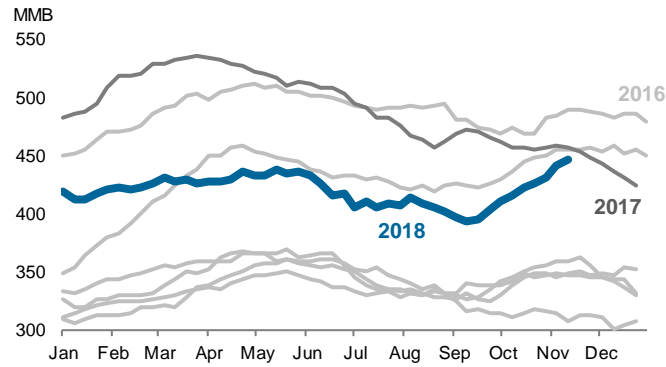
Source: U.S. Energy Information Administration



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

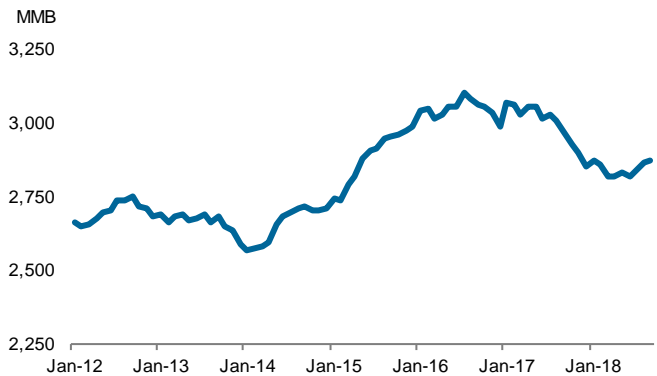
17 US Crude Oil Stocks
Historical Tracks and Current Year Levels



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

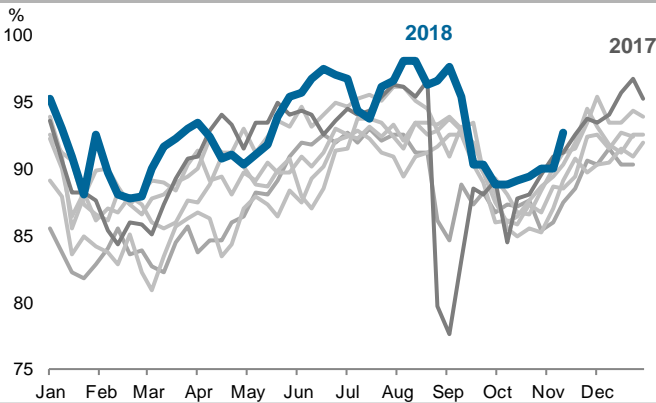
18 OECD Total Industry Oil Stocks
Monthly; 2012 to Present



OECD stock levels can affect crude oil prices.

Source: International Energy Agency

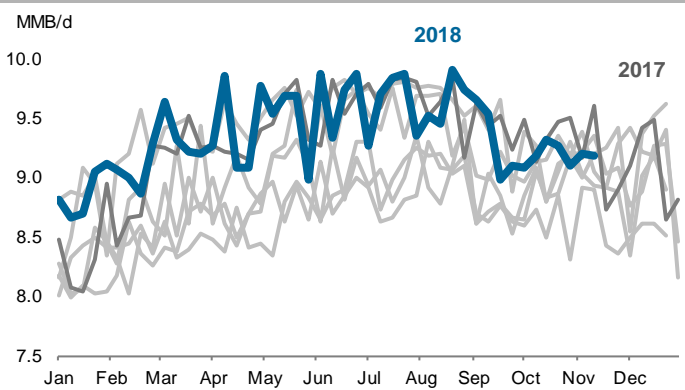
19 US Weekly Refinery Utilization Rates (%)
Historical Tracks and Current Year Levels



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

Source: U.S. Energy Information Administration

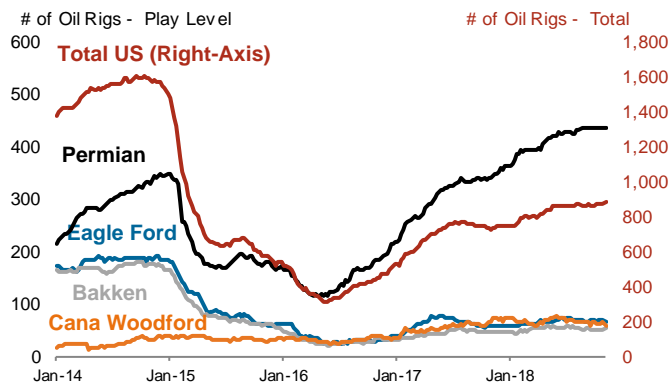
20 US Motor Gasoline Consumption
Historical Tracks and Current Year Levels



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

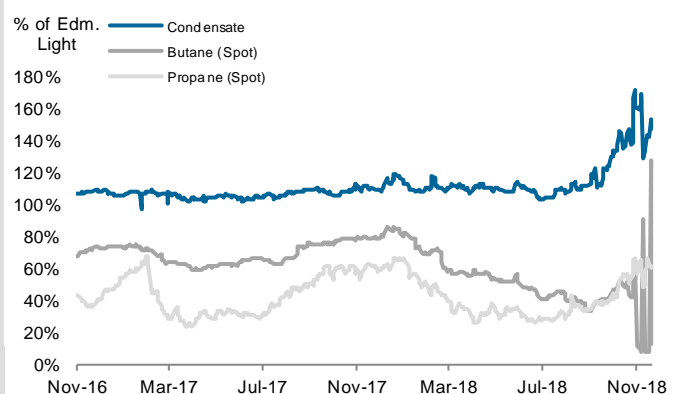
21 US Oil Drilling Activity
Baker Hughes Horizontal Oil Rig Counts; 2014 to Present



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

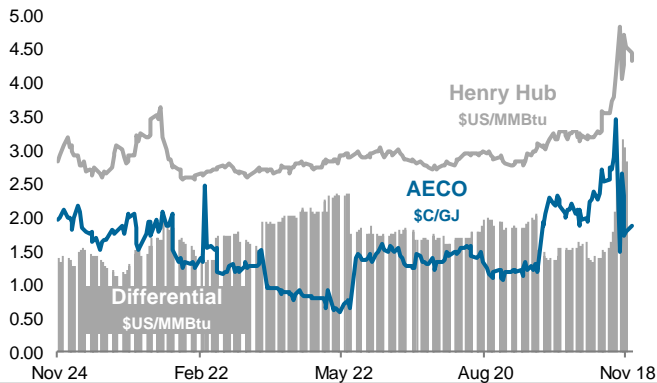


Natural gas liquids have become critical contributors to producer's cash flow. Prices are influenced by the price of oil as well as local supply and demand.

Source: Bloomberg, ARC Financial Corp.

23 Near-Month North American Natural Gas Prices

Daily Prices; Rolling 12-Month History

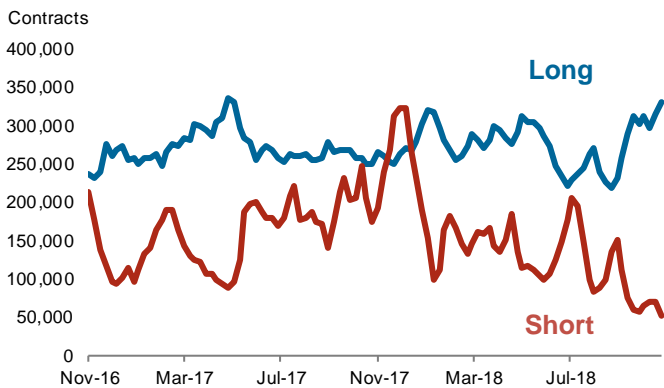


Near-month prices at AECO track Henry Hub prices, the exchange rate and the cost of transportation. Local factors can also affect price.

Source: Bloomberg

25 Long and Short Contracts – Henry Hub

Managed Money - Futures

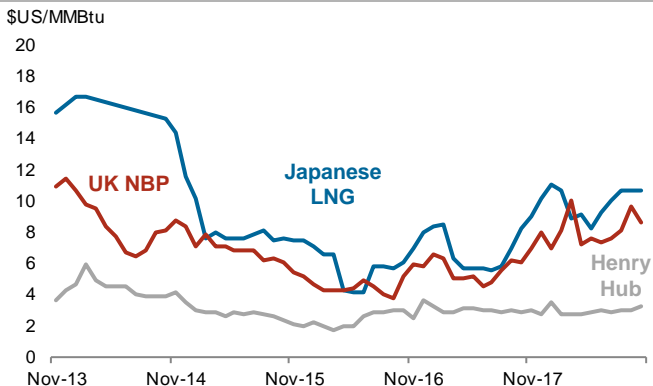


Long contracts take the position that Henry Hub gas price will increase, while short contracts expect a decline.

Source: U.S. Commodity Futures Trading Commission

27 Global Natural Gas Prices

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

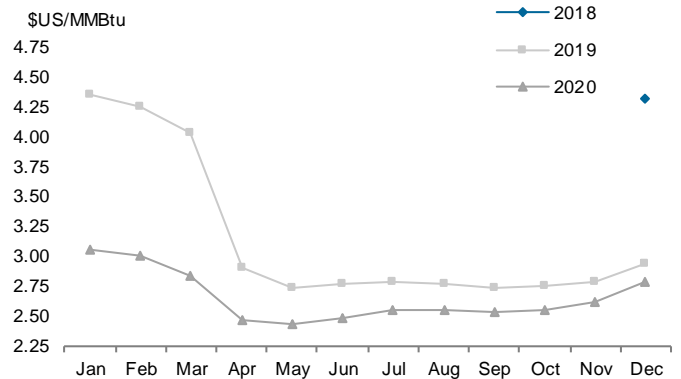


International natural gas prices strongly impact the economics of proposed LNG projects.

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

24 US Natural Gas Futures

Nymex (Henry Hub) 2018 to 2020

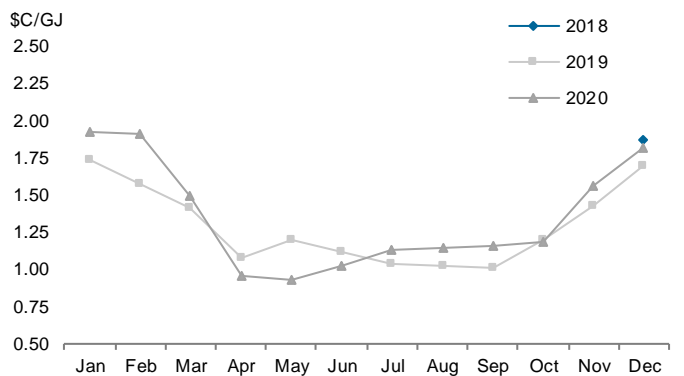


Forward contract prices are plotted against months in the calendar year. Years are distinguished by color and symbol coding.

Source: Bloomberg

26 Canadian Natural Gas Futures

AECO Hub (Bloomberg Estimate) 2018 to 2020

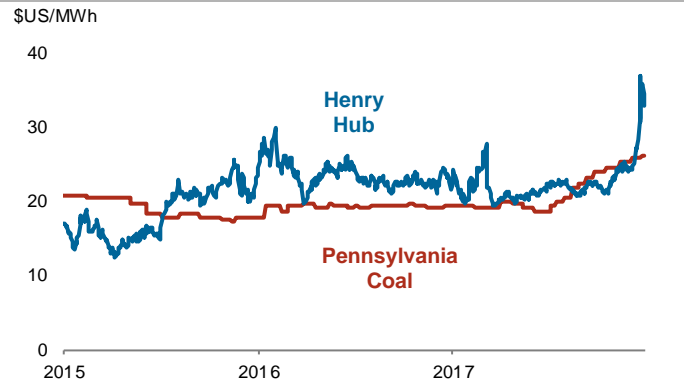


AECO forward prices mimic Henry Hub futures minus a differential.

Source: Bloomberg

28 US Coal and Natural Gas Power Generation Cost

Converted to a \$/MWh Equivalent

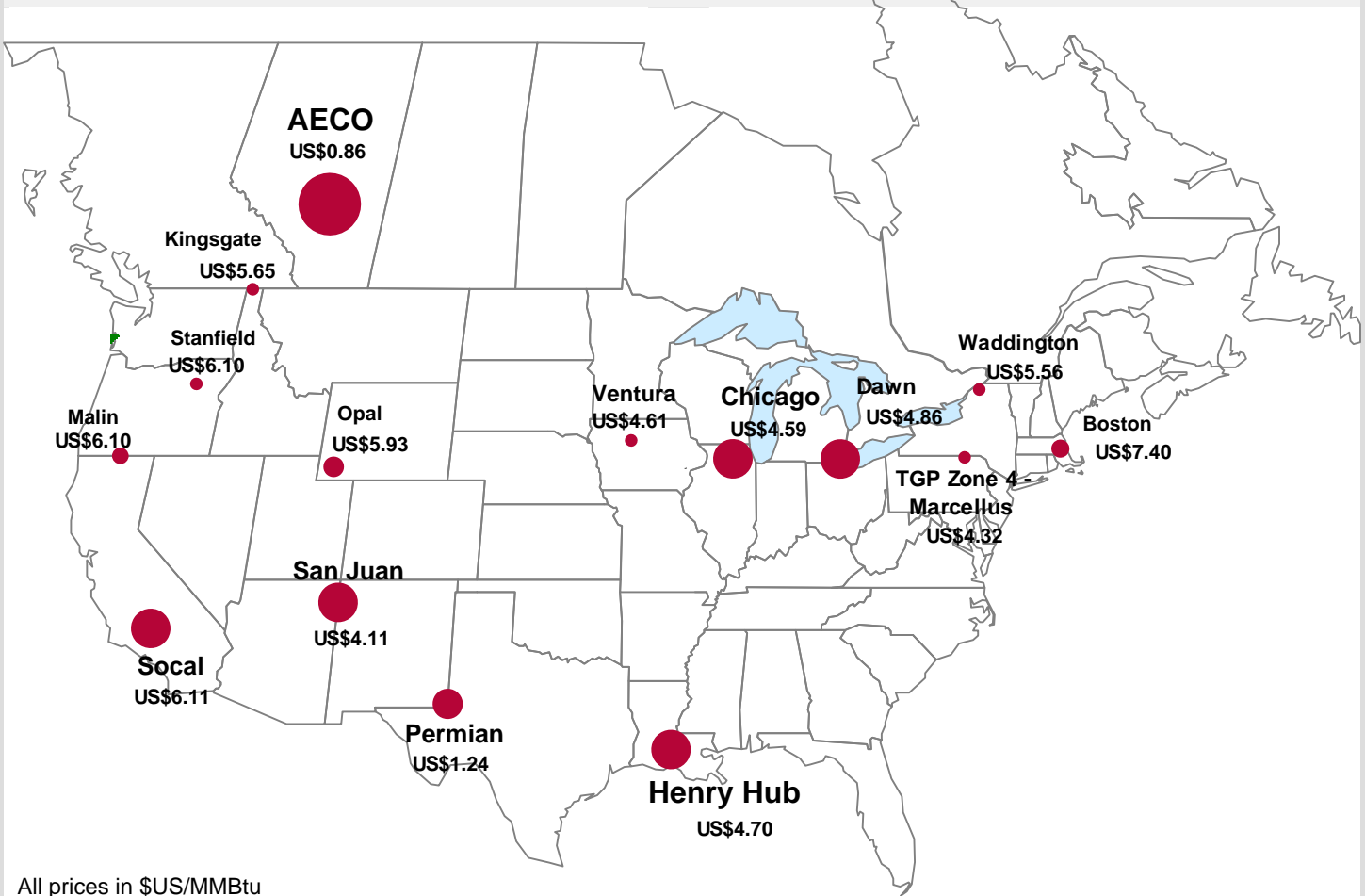


This graph illustrates when it may be economic to begin coal-gas switching in power generation. Average power plant efficiencies are assumed.

Source: Bloomberg

29

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

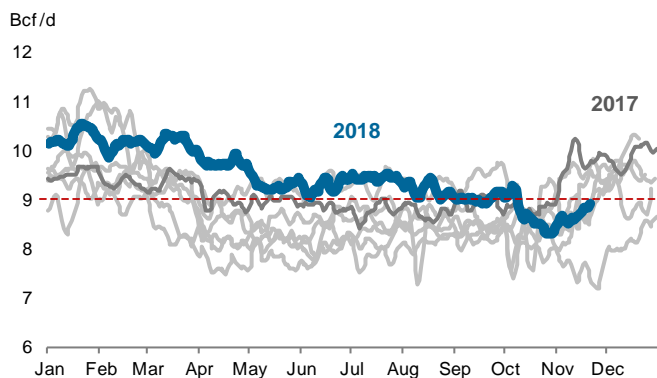


All prices in \$US/MMBtu

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

Source: Bloomberg

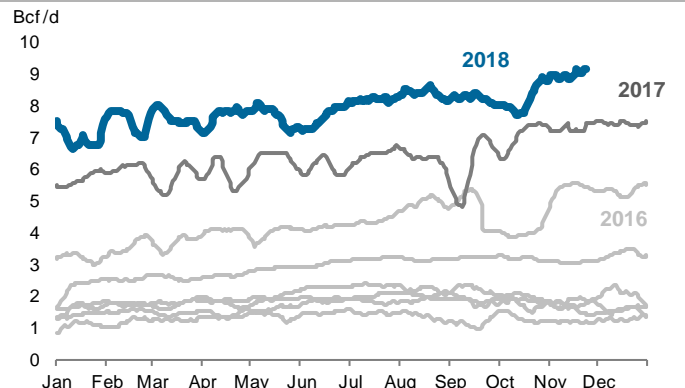
30 Pipeline Flows Out of Western Canada Daily; Historical Tracks and Current Year Levels



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

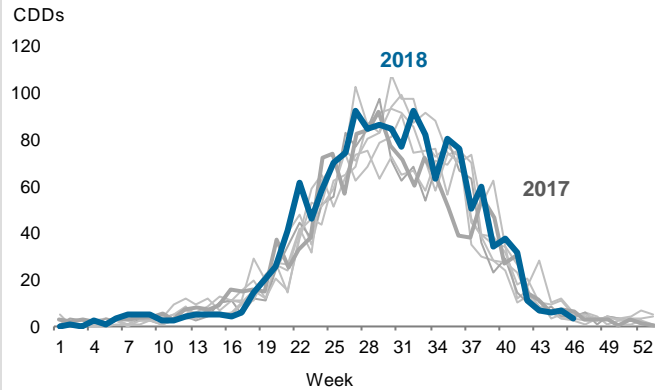


Between exports to Mexico and LNG shipments, the US is growing as a natural gas exporter. Robust US supply growth has driven this trend.

Source: Bentek

32 US Weekly Cooling Degree Days

Source: NOAA

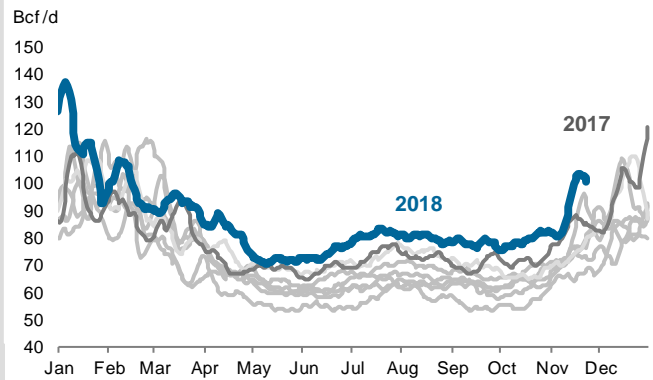


Weekly natural gas demand is directly tied to the weather. The current year is in dark blue.

Source: National Oceanic and Atmospheric Administration

33 US Total Natural Gas Demand

Daily; Historical Tracks and Current Year Levels

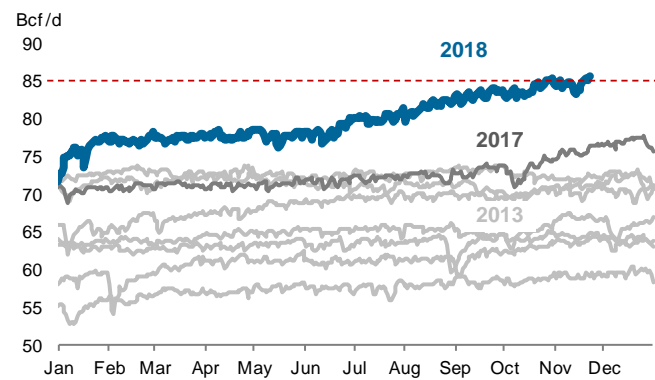


Total US demand fluctuates in the summer and during the winter as weather is an important driver of consumption.

Source: Bentek

34 Total US Dry Natural Gas Production

Historical Tracks and Current Year Levels

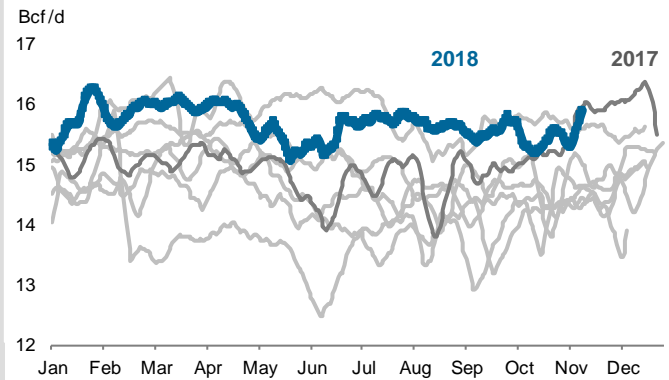


US production started ramping up in late 2007 and continues to grow year over year.

Source: Bentek

35 Daily Western Canadian Production

Estimated Using Major Pipeline Receipts

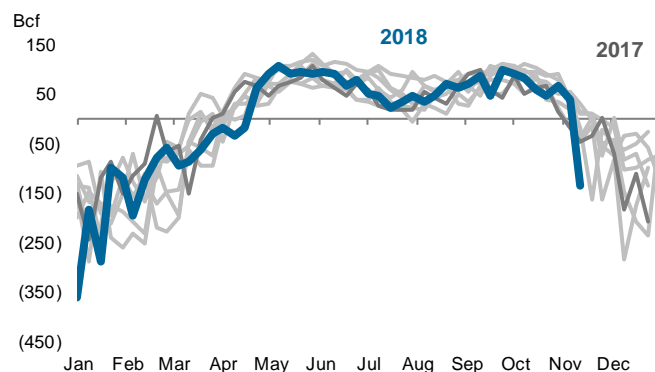


This includes receipts on the TCPL, Alliance, WestCoast and TransGas pipelines.

Source: Various Pipeline Companies

36 Weekly US Natural Gas Storage Net Change

Weekly Injection or (Withdrawals); 2009 to Current

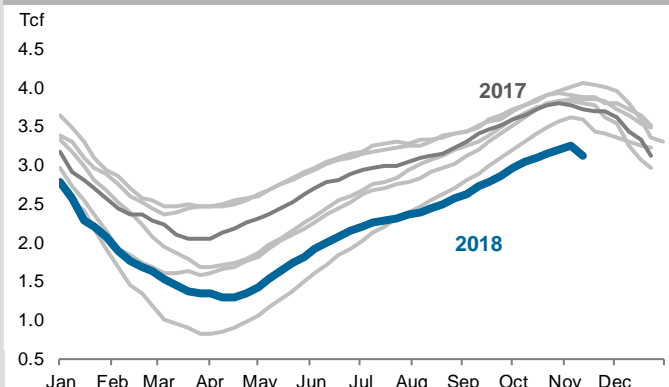


Weekly gas storage reports provide a snapshot of supply and demand. Current year changes are represented by the blue line.

Source: U.S. Energy Information Administration

37 Total Working Natural Gas in US Storage

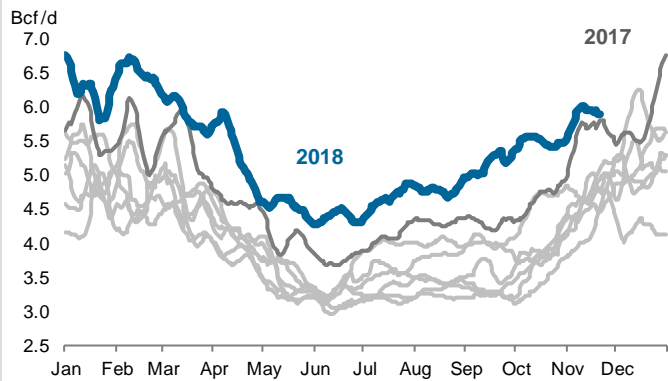
Historical Tracks and Current Year Levels



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

Source: U.S. Energy Information Administration

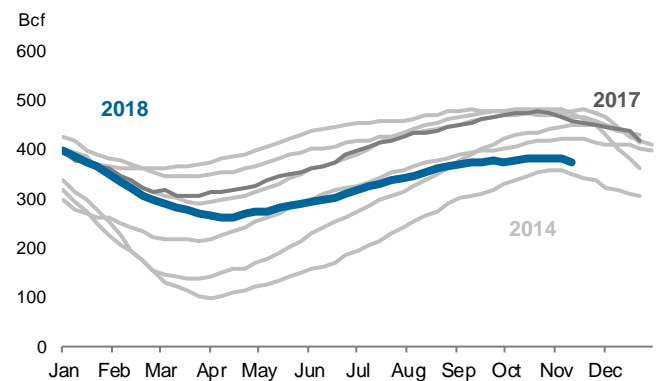
38 Alberta Natural Gas Demand
TransCanada Intra-AB Deliveries; Current Year and Historical Tracks



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

Source: TransCanada Pipelines

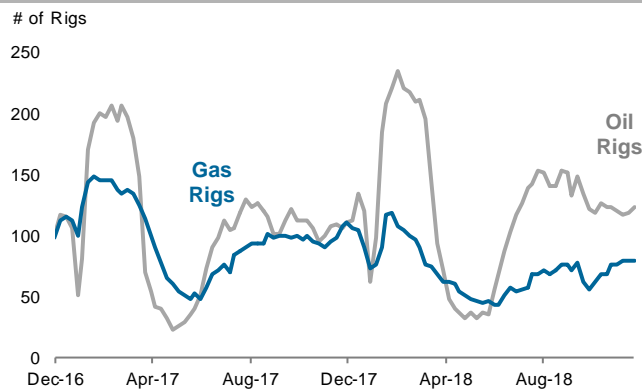
39 Western Canadian Natural Gas Storage Levels
Weekly; Current Year and Historic Tracks



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

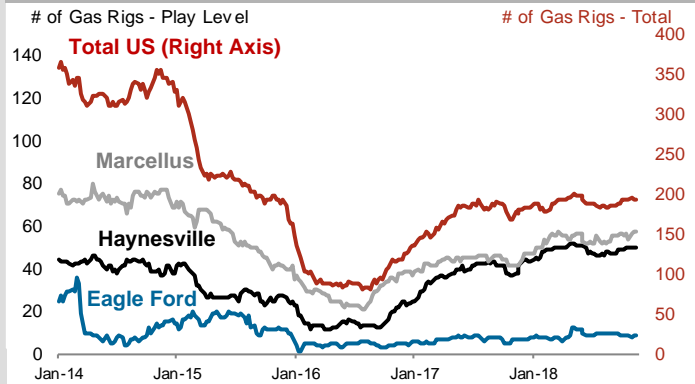
40 Weekly Canadian Oil and Gas Drilling Activity
Baker Hughes Average Rig Counts; Rolling 24-Month History



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

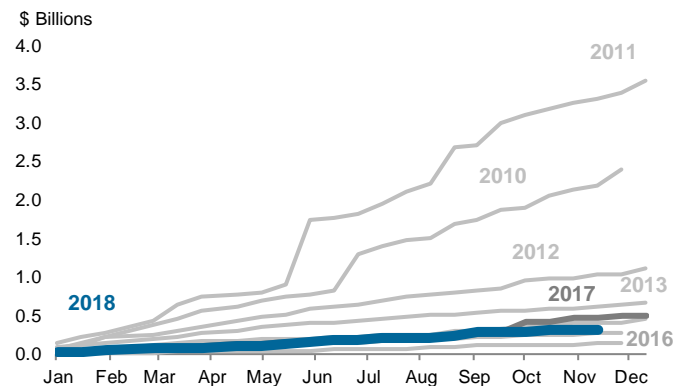
41 US Gas Drilling Activity
Baker Hughes Horizontal Gas Rig Counts; 2014 to Present



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

Source: Baker Hughes

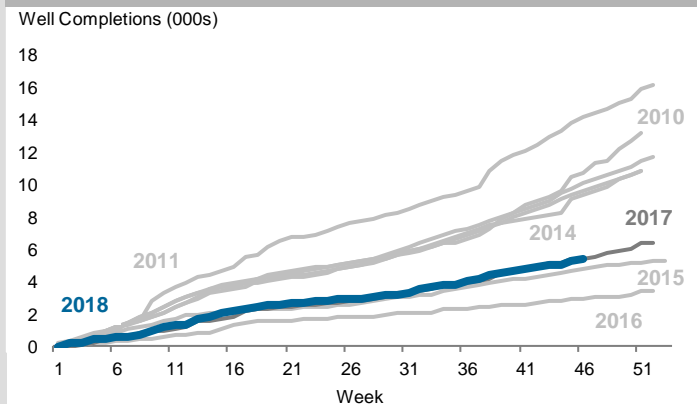
42 Alberta Crown Land Sales – Excluding Oil Sands
Year-over-Year; Cumulative



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

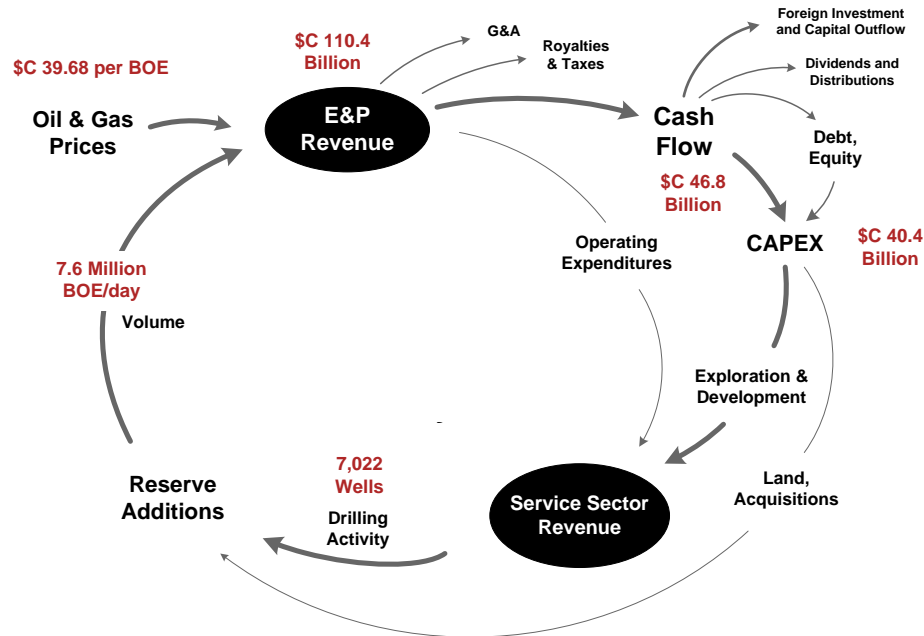


Relative year-over-year drilling activity is highlighted in this chart. Cumulative well completions for the current year are shown in blue.

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



44

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	%	%	%
2009	42.26	66.42	3.79	1,840	1,331	2,514	5,683	89,057	36,680	22,335	11,227	0.91	8,368	25%	41%	51%
2010	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%
2011	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%
2012	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%
2013	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%
2014	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%
2015	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%
2016	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%
2017e	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%
2018e	39.68	71.75	1.50	2,033	2,984	2,603	7,620	110,369	46,822	27,880	12,529	0.86	7,022	24%	70%	30%

Advisories and Disclaimers: This document is provided for informational purposes only and none of the information contained herein is intended to provide, nor should be construed as, investment, financial, legal or other advice and should not be relied upon as such. Certain of the information and data contained herein has been obtained or prepared from publicly available documents and other sources prepared by third parties, and ARC has relied upon such information and data. ARC does not audit or independently verify such information and data and ARC makes no representations or warranties as to the accuracy or completeness of such information and data nor the conclusions derived therefrom. This document has been published on the basis that ARC shall not be responsible for, and ARC hereby expressly disclaims any responsibility or liability for, any financial or other losses or damages of any nature whatsoever arising from or otherwise relating to any use of this document.

Certain information contained herein may constitute forward-looking information and forward-looking statements" (collectively, "forward-looking statements") under the meaning of applicable Canadian securities laws. Forward-looking statements include estimates, plans, expectations, intentions, opinions, forecasts, projections, guidance or other statements that are not statements of fact, including but not limited to global and industry economic conditions and policies, production, demand and commodity prices. Although ARC believes that the assumptions underlying and expectations reflected in such forward-looking statements are reasonable, it can give no (and does not give any) assurance that such assumptions and expectations will prove to have been correct. Such forward-looking statements involve known and unknown risks, uncertainties and other factors outside of ARC's control that may cause actual results to differ materially from those expressed herein. Neither ARC nor any of its affiliates undertakes any obligation to publicly revise such forward-looking statements to reflect subsequent events or circumstances, except as required by law.