

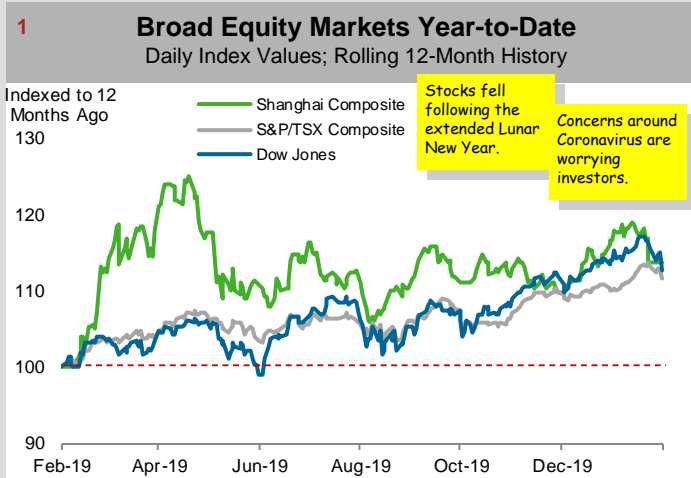
## ARC Energy Charts

Visit [www.arcenergyinstitute.com](http://www.arcenergyinstitute.com) for more information on this publication and the Institute

### Chart Watch

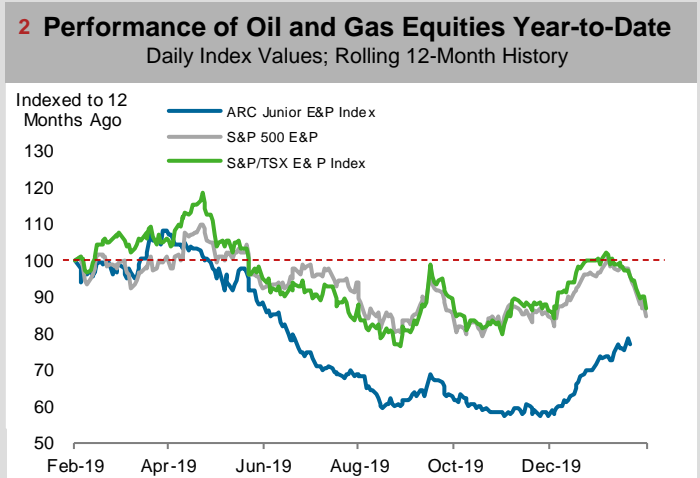
- 1 Shanghai composite falls as trading resumes
- 5 WTI fell sharply last week on virus fears
- 7 Positive decision for Line 3
- 10 US oil production hit a record high in November
- 11 AB oil production hit a record in September

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
50.11 ↓	41.48 ↓	1.90 ↓	1.87 ↓	0.41 ↓	0.7526 ↓



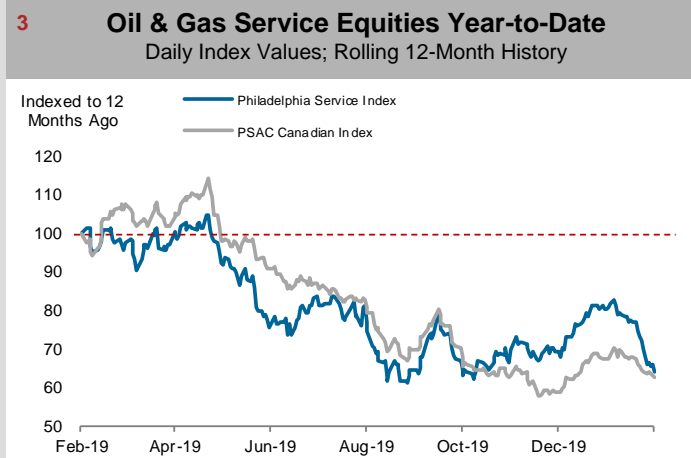
Broad market indices are one the many vital signs measuring the health of the economy. Energy demand is a function of economic health.

Source: Bloomberg, ARC Financial Corp.



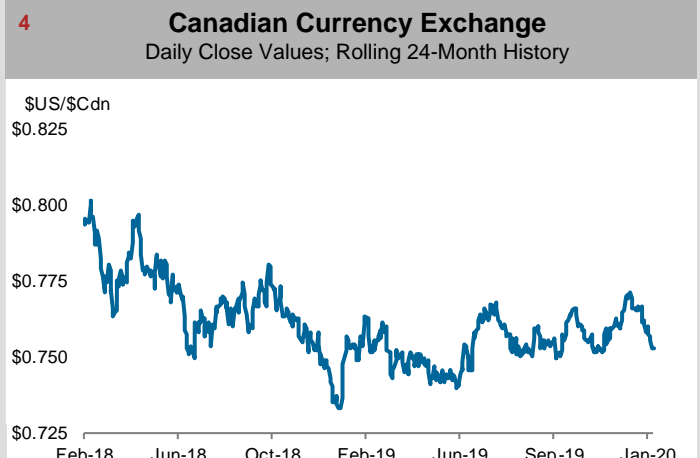
Performance of Canadian and US oil & gas equities are compared against each other.

Source: Bloomberg, ARC Financial Corp.



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



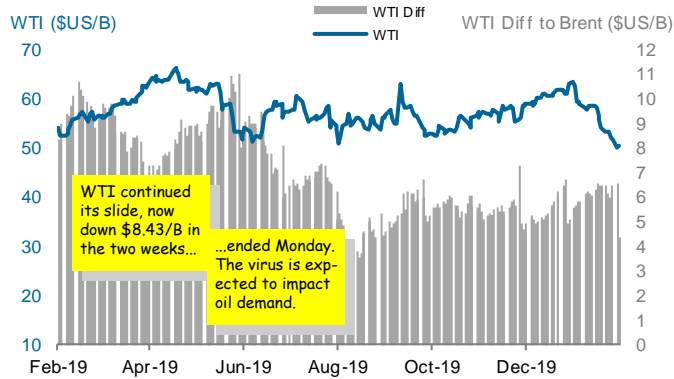
Much of Canada's oil and gas production is sold in US dollars. As such, the exchange rate significantly impacts corporate revenues and profits.

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

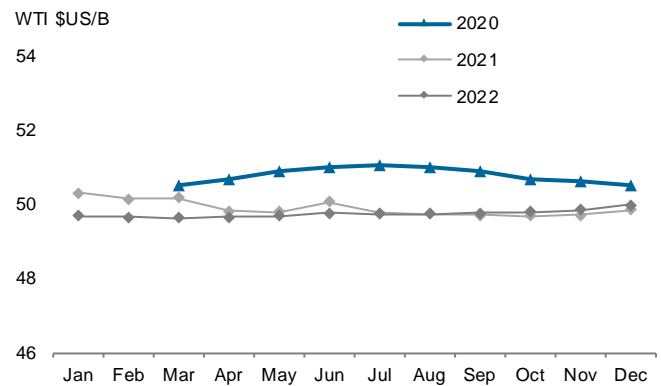


North American crude oil prices can sometimes disconnect from global prices depending on regional supply and demand dynamics.

Source: Bloomberg

### 6 US Crude Oil Futures

West Texas Intermediate (WTI) 2020 to 2022

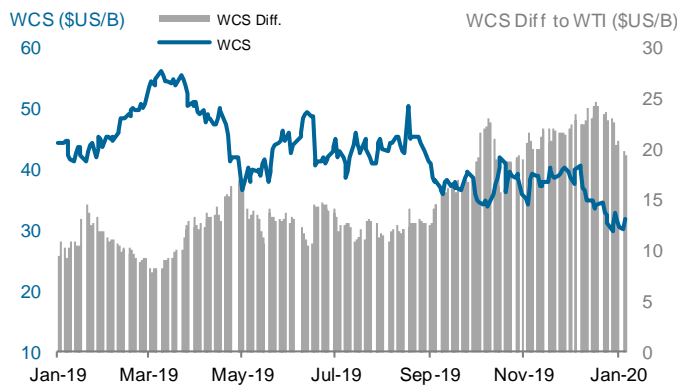


Forward prices for WTI are plotted against months in the calendar year. Years are distinguished by color and symbol coding.

Source: Bloomberg

### 7 Canadian Heavy Oil Price Differential to WTI

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

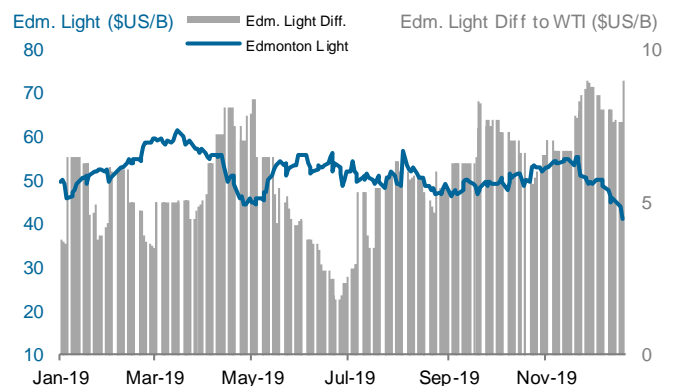


The differential should reflect quality differences and transportation costs. Greater discounts can result from infrastructure or refinery outages.

Source: Bloomberg

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

WTI and Edmonton Light differential; Rolling 12-Month History

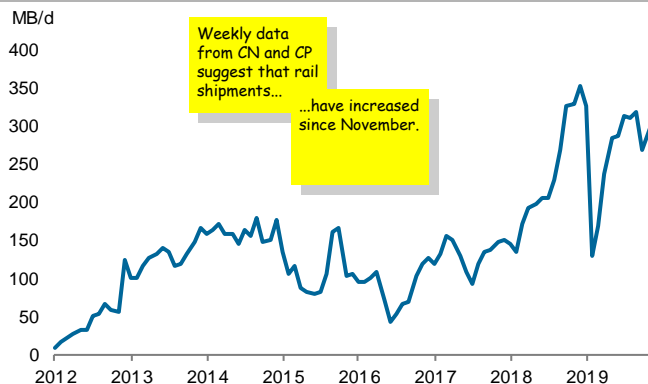


The differential should reflect the transportation cost from Alberta to Cushing. Greater discounts can result from infrastructure or refinery outages.

Source: Bloomberg

### 9 Canadian Crude Oil Exports by Rail

Monthly; 2012 to Present

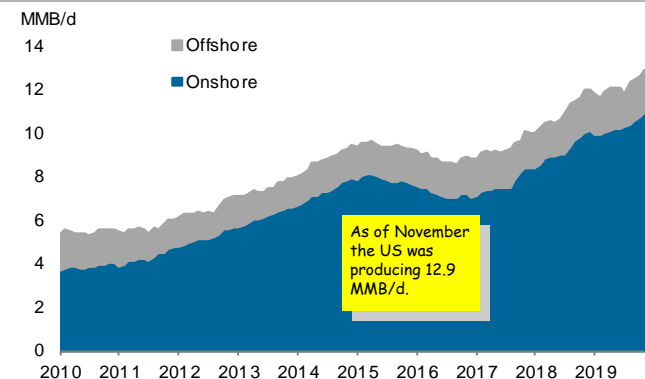


Rail is expected to grow as the pipelines have hit the limit for moving additional barrels of crude oil, and supply is still growing.

Source: National Energy Board

### 10 Total US Oil Production

Monthly; 2010 to Present

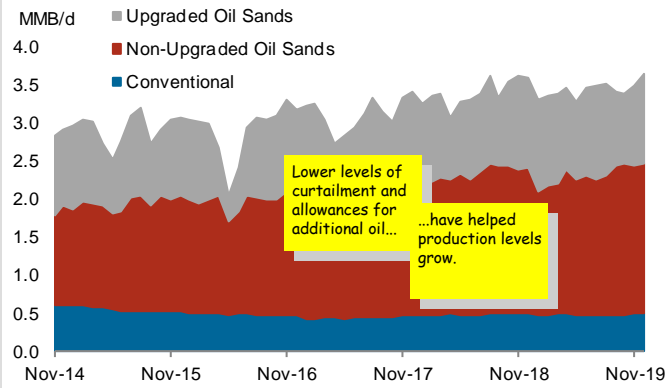


The advancement of drilling and completion methods is increasing US crude oil production.

Source: Bloomberg, U.S. Energy Information Administration

### 11 Alberta Oil Production

Monthly; Conventional and Oil Sands

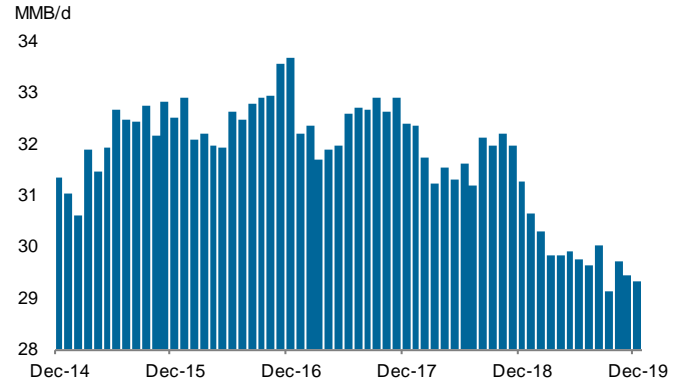


Most of Canada's oil production comes from Alberta; split between oil sands and conventional production.

Source: Alberta Energy Regulator

### 12 OPEC Oil Production

Monthly; Rolling 60-Month History

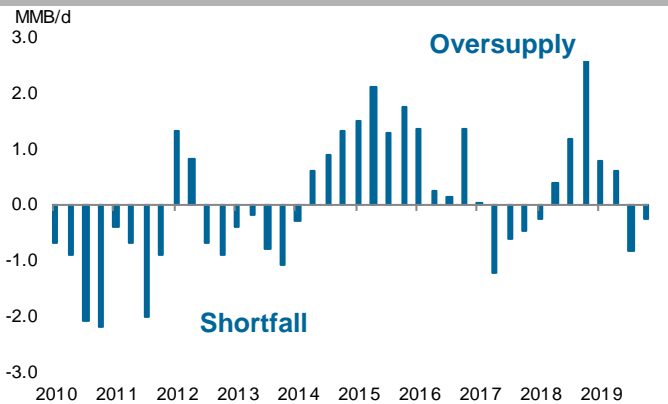


OPEC's production levels relative to its sustainable and spare capacity influences global crude prices. Note: scale has been expanded.

Source: Petroleum Intelligence Weekly

### 13 Global Oil Supply-Demand Balance

Quarterly; 2010 to Present

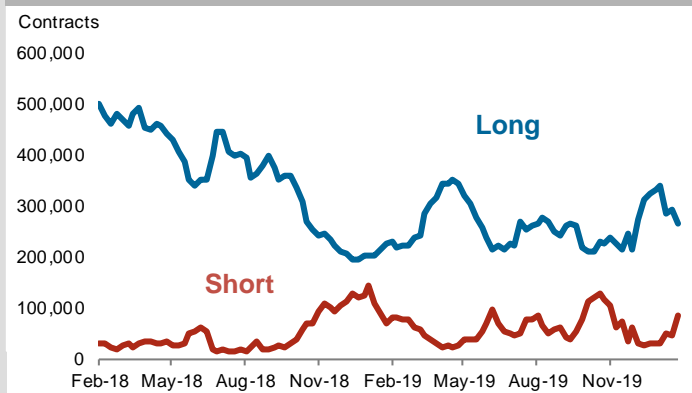


Negative numbers indicate a global crude shortfall, while positive numbers indicate an oversupply.

Source: International Energy Agency

### 14 Long and Short Contracts - WTI

Managed Money - Futures

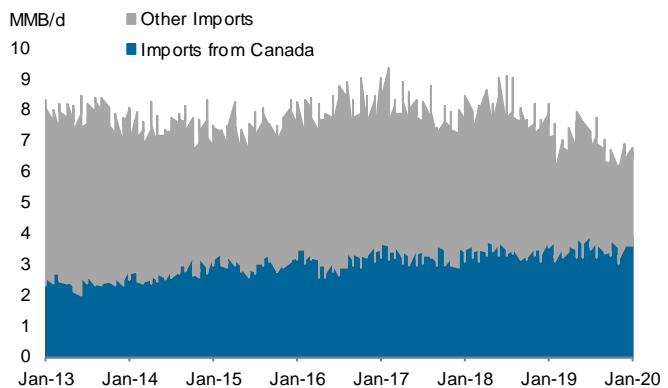


Long contracts take the position that WTI oil price will increase, while short contracts expect a decline.

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

### 15 US Crude Oil Imports

Weekly Data; 2013 to Present

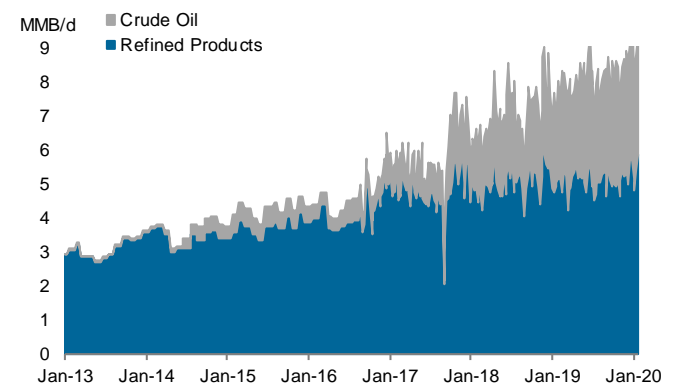


Crude oil imports from Canada are taking market share from overseas imports.

Source: U.S. Energy Information Administration

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

Weekly Data; 2013 to Present

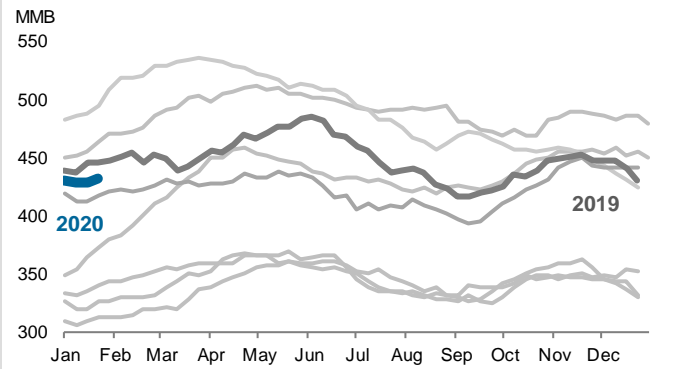


The US exports more refined products than crude oil. With the rapid growth of tight oil, most export growth should come from crude oil exports.

Source: U.S. Energy Information Administration

### 17 US Crude Oil Stocks

Historical Tracks and Current Year Levels

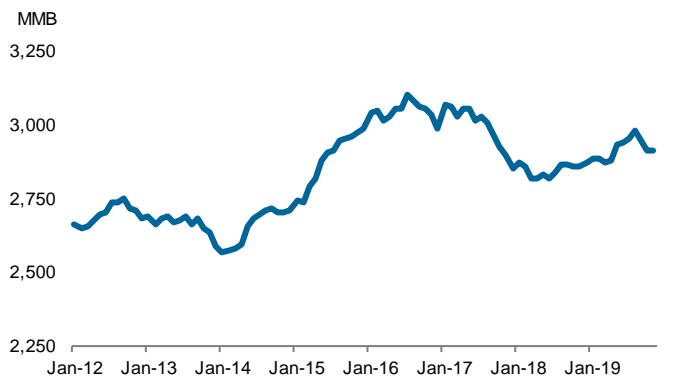


US crude oil stock levels can affect crude oil prices. Stock levels for the current year are represented by the blue line.

Source: U.S. Energy Information Administration

### 18 OECD Total Industry Oil Stocks

Monthly; 2012 to Present

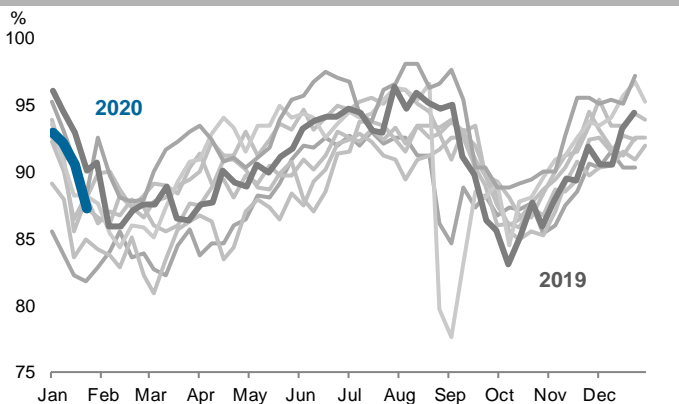


OECD stock levels can affect crude oil prices.

Source: International Energy Agency

### 19 US Weekly Refinery Utilization Rates (%)

Historical Tracks and Current Year Levels

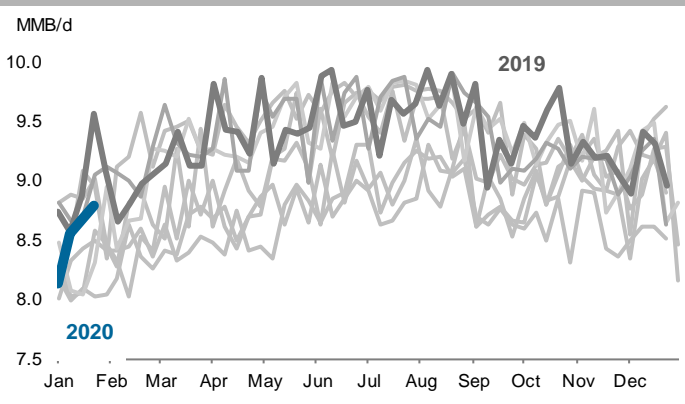


Refinery utilization rates change the supply of refined products, impacting price. Utilization for the current year is blue.

Source: U.S. Energy Information Administration

### 20 US Motor Gasoline Consumption

Historical Tracks and Current Year Levels

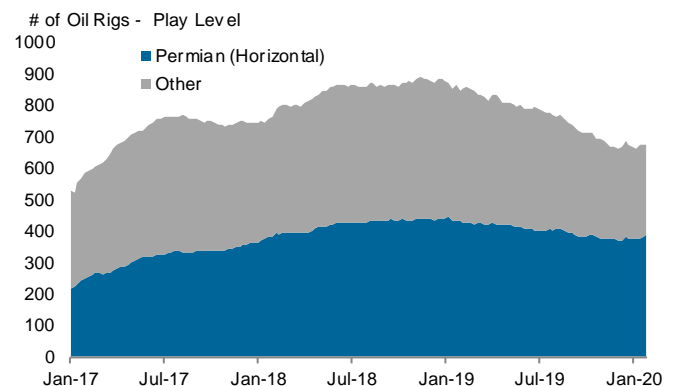


Gasoline consumption accounts for almost half of all oil use in the US. Gasoline consumption for the current year is represented by the blue line.

Source: U.S. Energy Information Administration

### 21 US Oil Drilling Activity

Baker Hughes Oil Rig Counts; 2017 to Present

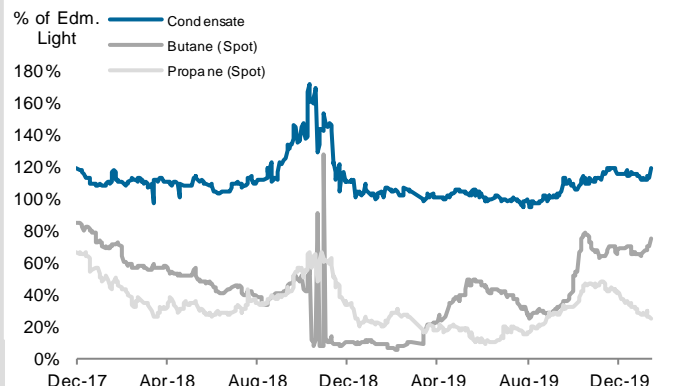


Tracking US oil drilling by major play provides insight into the composition of US oil supply and growth trends.

Source: Baker Hughes

### 22 Daily NGL Prices as a % of Edmonton Light

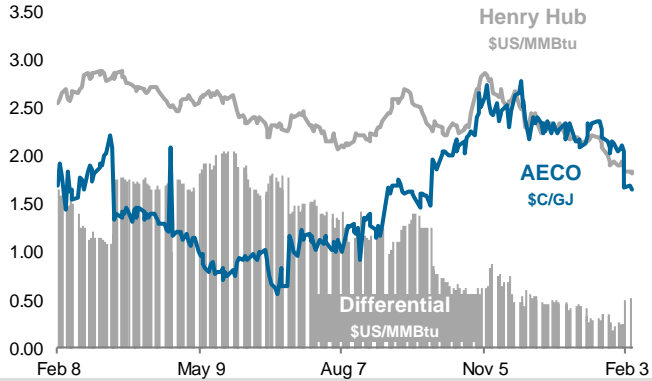
Propane & Butane Spot Prices at Edmonton, AB



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.

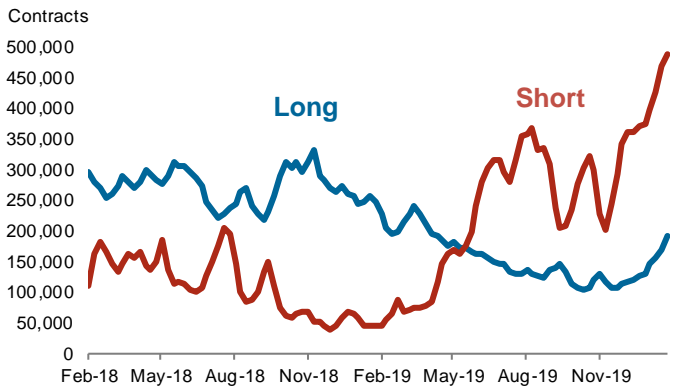
**23 Near-Month North American Natural Gas Prices**  
Daily Prices; Rolling 12-Month History



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

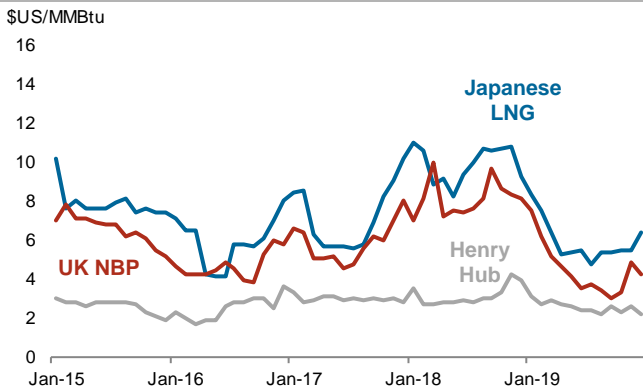
**25 Long and Short Contracts – Henry Hub**  
Managed Money - Futures



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

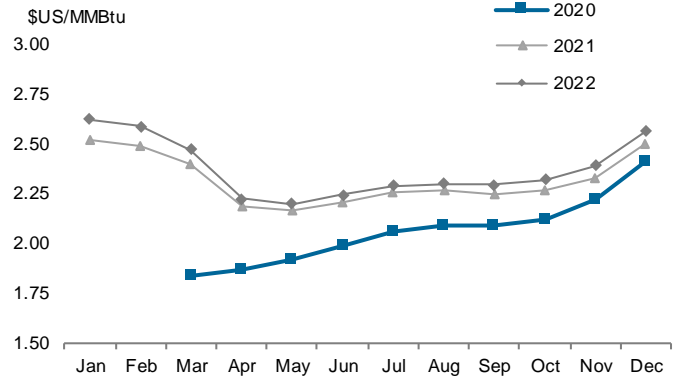
**27 Global Natural Gas Prices**  
Japanese LNG, UK NBP, Henry Hub; Average Monthly Prices



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

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

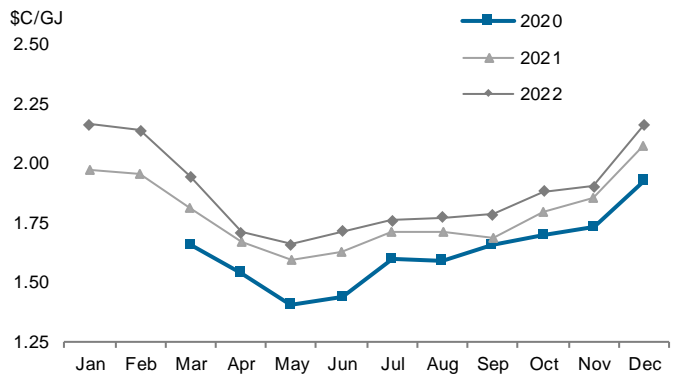
**24 US Natural Gas Futures**  
Nymex (Henry Hub) 2020 to 2022



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

Source: Bloomberg

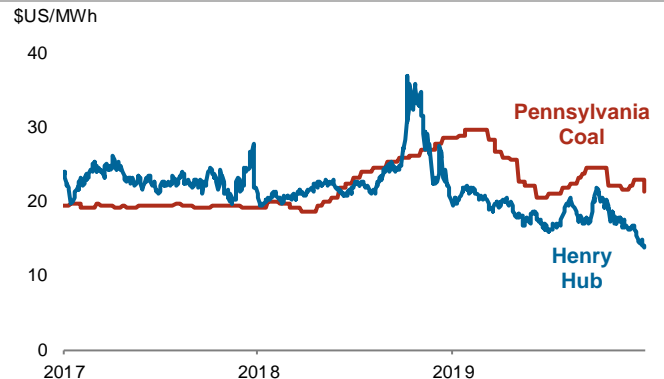
**26 Canadian Natural Gas Futures**  
AECO Hub (Bloomberg Estimate) 2020 to 2022



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

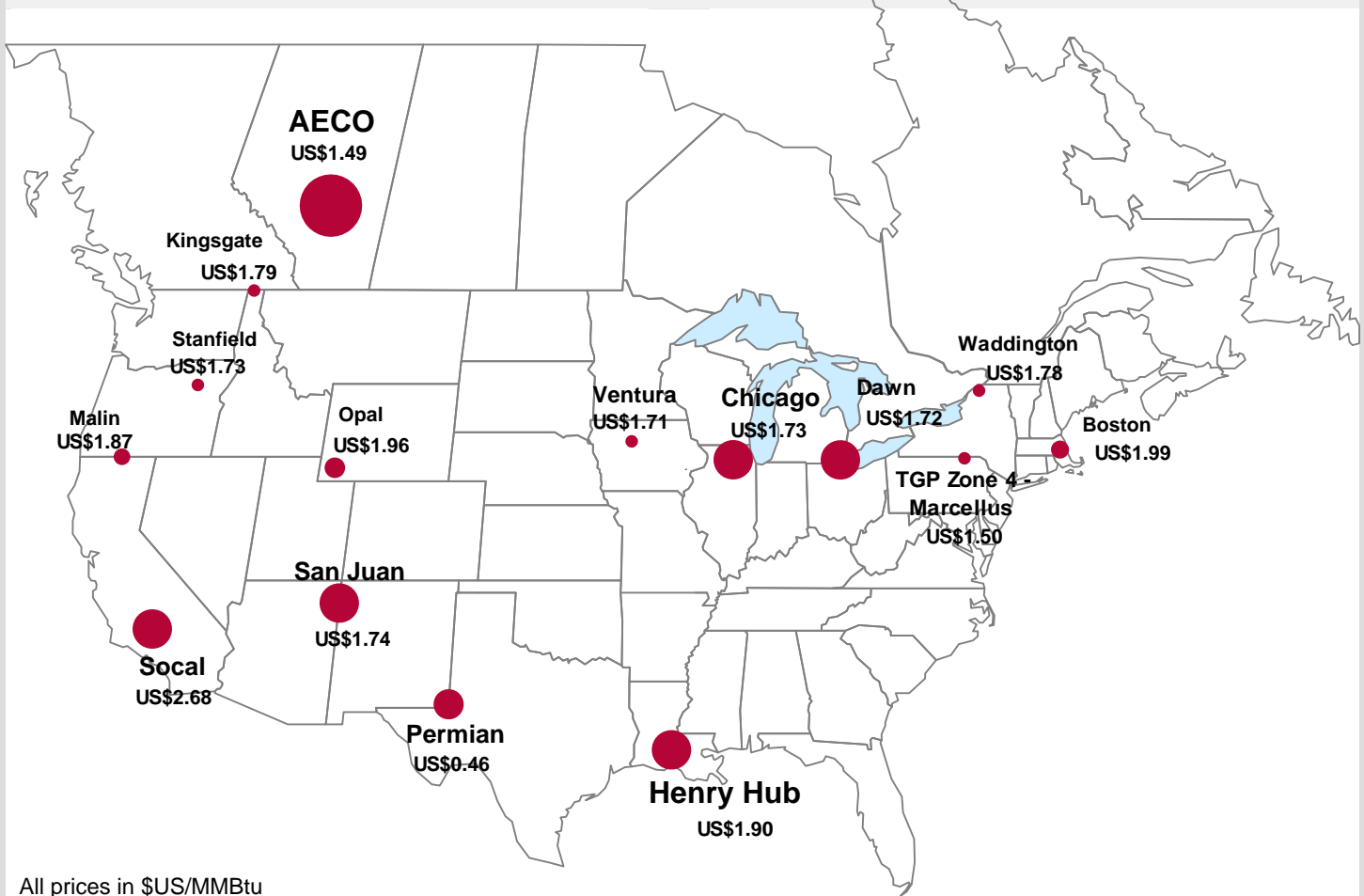


This graph illustrates when it may be economic to begin coal-gas switching in power generation. Average power plant efficiencies are assumed.

Source: Bloomberg

29

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

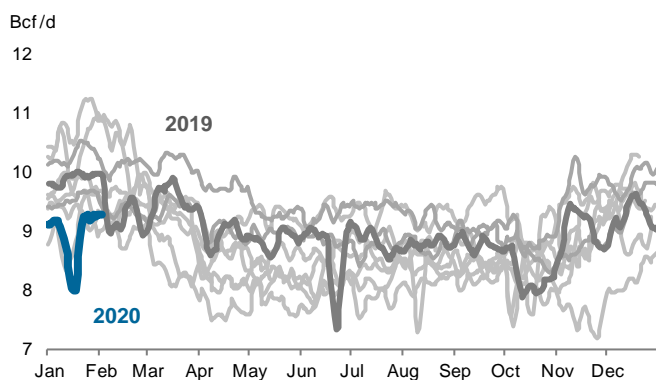


All prices in \$US/MMBtu

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

Source: Bloomberg

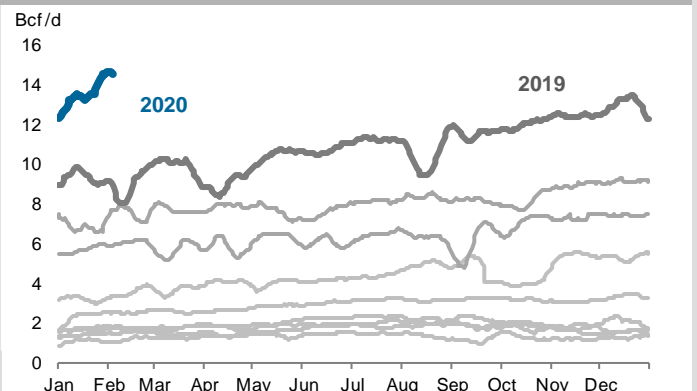
### 30 Pipeline Flows Out of Western Canada Daily; Historical Tracks and Current Year Levels



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

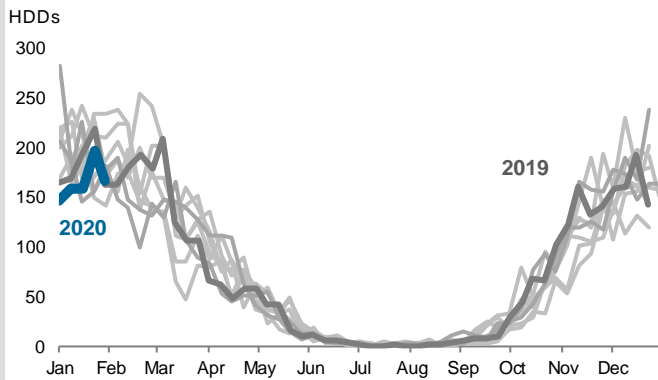
### 31 US Natural Gas Exports – Excluding Canada Daily; Historical Tracks and Current Year Levels



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

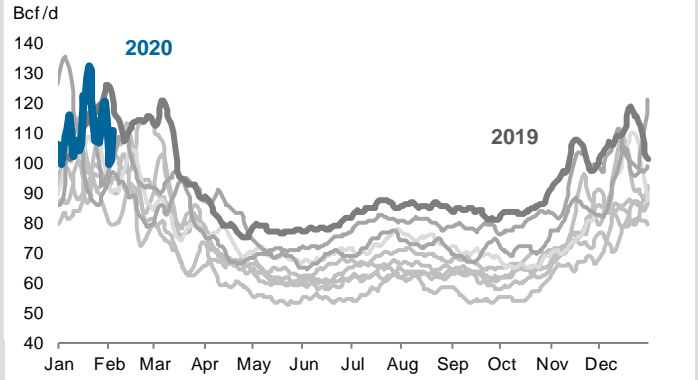
**32 US Weekly Heating Degree Days**  
Source: NOAA



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

Source: National Oceanic and Atmospheric Administration

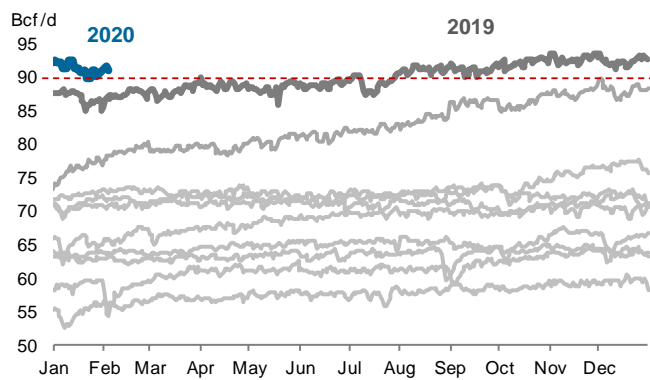
**33 US Total Natural Gas Demand**  
Daily; Historical Tracks and Current Year Levels



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

Source: Bentek

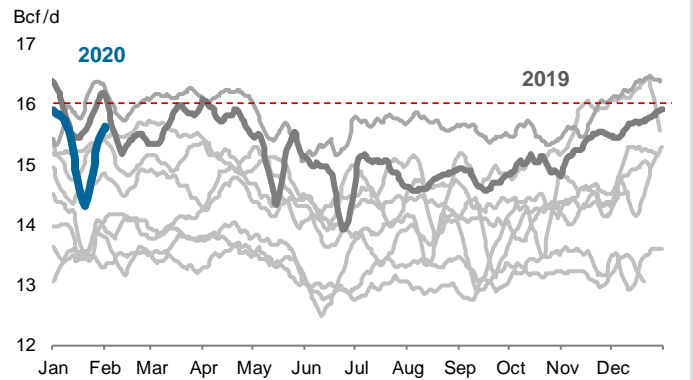
**34 Total US Dry Natural Gas Production**  
Historical Tracks and Current Year Levels



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

Source: Bentek

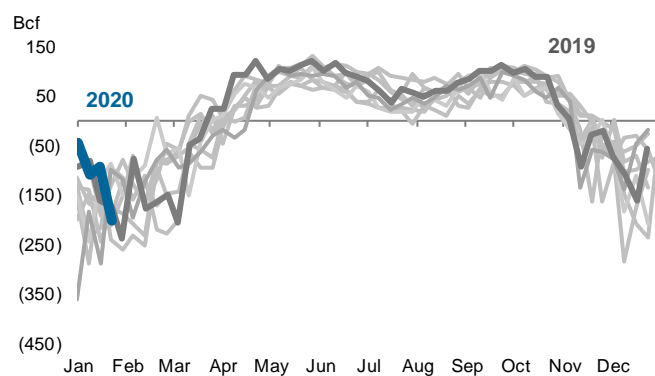
**35 Daily Western Canadian Production**  
Estimated Using Major Pipeline Receipts



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

Source: Various Pipeline Companies

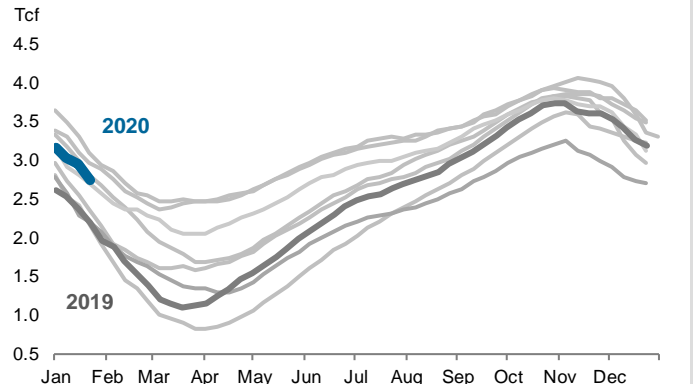
**36 Weekly US Natural Gas Storage Net Change**  
Weekly Injection or (Withdrawals); 2009 to Current



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



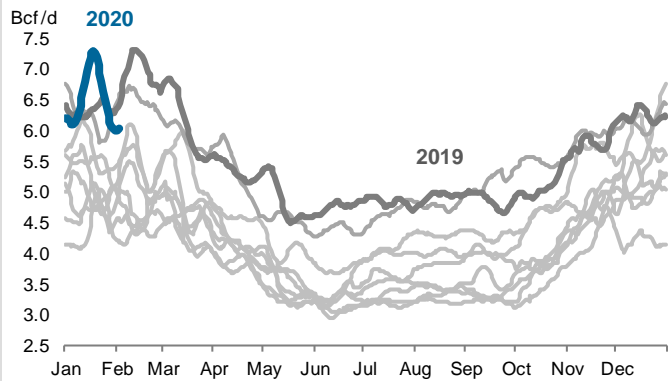
The EIA reports changes in US natural gas inventories held in underground storage facilities on a weekly basis.

Source: U.S. Energy Information Administration



#### 38 Alberta Natural Gas Demand

TransCanada Intra-AB Deliveries; Current Year and Historical Tracks

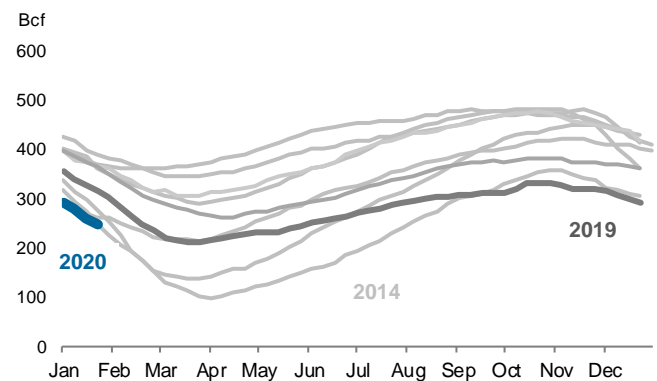


Alberta natural gas demand has grown steadily in recent years, largely driven by new oil sands demand and power generation projects.

Source: TransCanada Pipelines

#### 39 Western Canadian Natural Gas Storage Levels

Weekly; Current Year and Historic Tracks

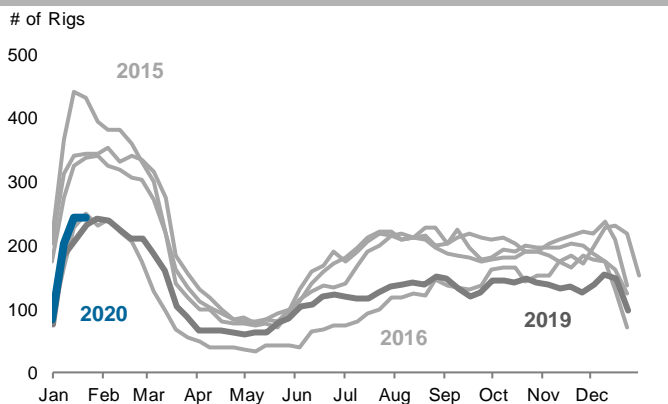


Canada's natural gas storage level provides a good metric if the country is well stocked. Abnormally high or low storage can affect the basis.

Source: Bloomberg

#### 40 Weekly Canadian Oil and Gas Drilling Activity

Baker Hughes Drilling Rig Count; Current Year and Historical Tracks

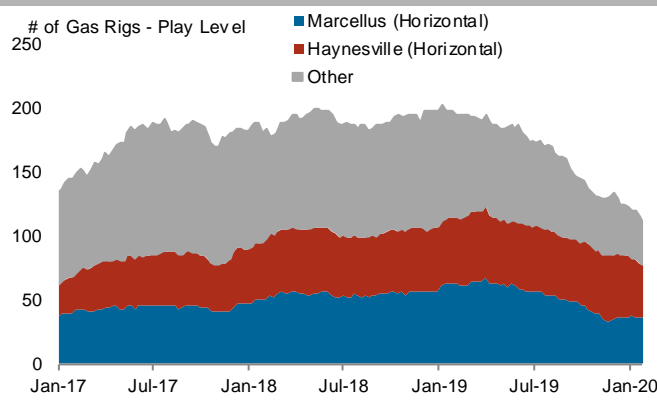


Unlike US drilling activity, Canadian rigs are dispatched seasonally. Capital allocation by operators is driven by views of future oil and gas prices.

Source: Baker Hughes

#### 41 US Gas Drilling Activity

Baker Hughes Gas Rig Counts; 2017 to Present

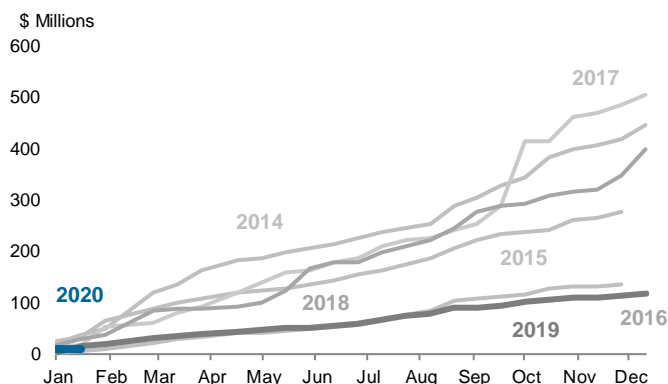


Tracking US gas drilling by major play provides insight into the composition of US gas supply and growth trends.

Source: Baker Hughes

#### 42 Alberta Crown Land Sales – Excluding Oil Sands

Year-over-Year; Cumulative

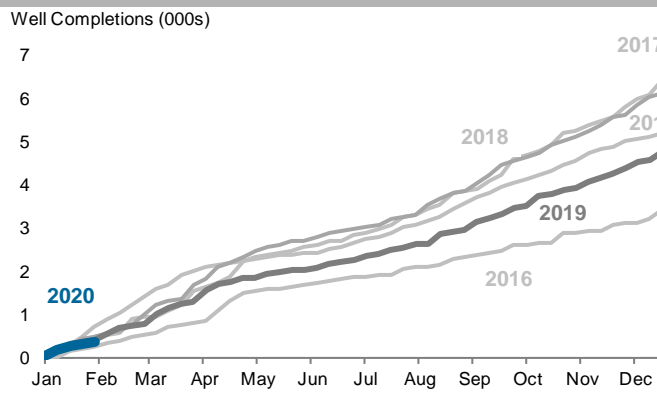


Land prices are an important component of F&D costs. In Alberta, sales of petroleum and natural gas rights are held every two weeks.

Source: Alberta Department of Energy

#### 43 Canadian Cumulative Well Completions

Current Year vs Years Prior



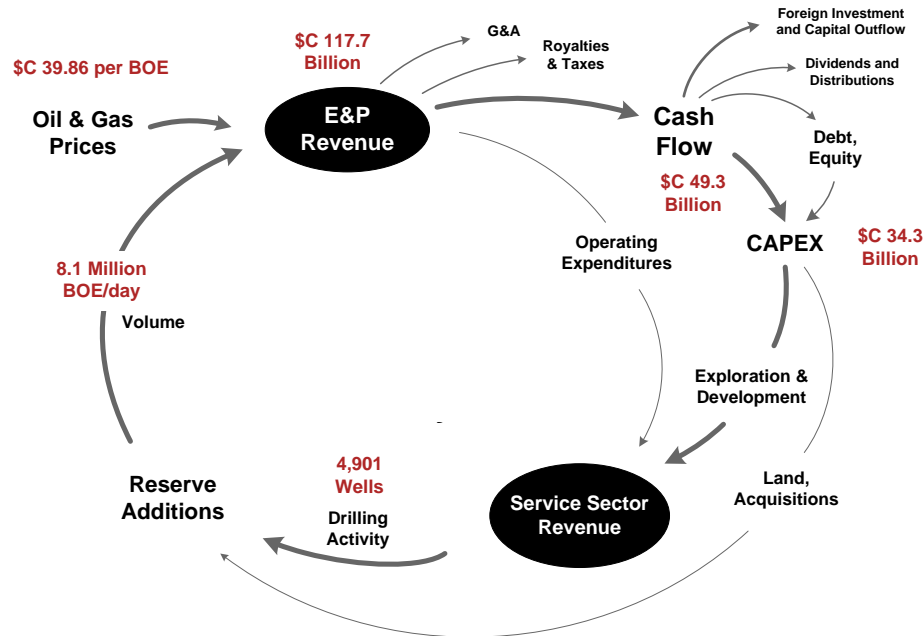
Relative year-over-year drilling activity is highlighted in this chart. Cumulative well completions for the current year are shown in blue.

Source: Daily Oil Bulletin/JWN



### Estimated Capital Flow in the Canadian Oil and Gas Economy for 2020

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	%	%	%
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	60.69	95.07	4.23	2,085	1,964	2,480	6,530	144,660	66,977	46,872	33,868	1.21	11,222	45%	78%	22%
2015	37.34	57.63	2.56	1,995	2,381	2,531	6,907	94,127	29,985	31,609	22,929	1.82	5,382	24%	69%	31%
2016	32.61	53.09	2.06	2,013	2,421	2,564	6,998	83,298	23,701	23,040	15,426	1.62	4,060	17%	70%	30%
2017	39.18	62.42	2.10	2,119	2,674	2,605	7,398	105,788	45,031	28,712	13,803	0.94	7,076	30%	70%	30%
2018	39.57	69.24	1.46	2,292	2,913	2,737	7,942	114,705	48,322	27,374	11,661	0.81	6,927	32%	70%	30%
2019e	40.86	68.82	1.71	2,133	3,018	2,758	7,909	117,952	51,280	23,160	12,024	0.69	4,886	24%	70%	30%
2020e	39.86	67.59	1.79	2,111	3,195	2,784	8,090	117,693	49,265	22,447	11,899	0.70	4,901	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.