Chart Watch

1. The DJIA fell the most in 2 years on Monday
2. Increased Coronavirus fears weigh on the market
3. OPEC production fell in January on cuts/outages
4. Canadian crude by rail near a record high in Dec
5. Permian gas prices are near zero currently
6. Teck withdraws its Frontier oil sands application
7. Much of Canada’s oil and gas production is sold in US dollars. As such, the exchange rate significantly impacts corporate revenues and profits.
8. Performance of Canadian and US oil & gas equities are compared against each other.
9. Broad market indices are one of the many vital signs measuring the health of the economy. Energy demand is a function of economic health.
10. Source: Bloomberg, ARC Financial Corp.
11. Performance of Canadian oil and gas service equities are plotted in tandem with the corresponding US index.
12. Source: Bloomberg, Petroleum Services Association of Canada

Spot WTI Crude
$US/B
47.40 ↑
1.94 ↑
1.72 ↑
0.57 ↓
0.7524 ↓

<table>
<thead>
<tr>
<th>Spot WTI Crude</th>
<th>Edmonton Light</th>
<th>Spot Henry Hub</th>
<th>Spot AECO</th>
<th>Spot AECO Basis</th>
<th>Currency</th>
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</thead>
</table>

1. Broad Equity Markets Year-to-Date
2. Performance of Oil and Gas Equities Year-to-Date
3. Oil & Gas Service Equities Year-to-Date
4. Canadian Currency Exchange

Visit www.arcenergyinstitute.com for more information on this publication and the Institute
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*
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. Note: scale has been expanded.

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
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

Refinery utilization rates change the supply of refined products, impacting price. Utilization for the current year is blue. 
Source: U.S. Energy Information Administration

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

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.
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

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

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

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

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

AECO forward prices mimic Henry Hub futures minus a differential.

Source: Bloomberg

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

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

Source: Bloomberg

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

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
Weekly natural gas demand is directly tied to the weather. The current year is in dark blue.
Source: National Oceanic and Atmospheric Administration

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

Weekly production started ramping up in late 2007 and continues to grow year over year.
Source: Bentek

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

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

This includes receipts on the TCPL, Alliance, WestCoast and TransGas pipelines.
Source: Various Pipeline Companies

The EIA reports changes in US natural gas inventories held in underground storage facilities on a weekly basis.
Source: U.S. Energy Information Administration

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

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*

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

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

Canadian Industry Metrics

<table>
<thead>
<tr>
<th>Price</th>
<th>Production Volume</th>
<th>Capital Inflow</th>
<th>Reinvestment</th>
<th>Drilling</th>
<th>Well Split</th>
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<tr>
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<td>Average</td>
<td>Edmonton Par</td>
<td>AECO</td>
<td>Conv. Liquid, Bitumen + Synthetic</td>
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<td></td>
<td>$/BOE</td>
<td>$C/B</td>
<td>$C/GJ</td>
<td>MBOE/d</td>
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