ENERGY INVESTMENT BANKING

MUSINGS FROM THE OIL PATCH

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Note: *Musings from the Oil Patch reflects an eclectic collection of stories and analyses dealing with issues and developments within the energy industry that I feel have potentially significant implications for executives operating and planning for the future. The newsletter is published every two weeks, but periodically events and travel may alter that schedule. As always, I welcome your comments and observations.* Allen Brooks

Summary:

Will Tesla Show The Need For More Subsidies For EV Success?

EV sales data for the first two months of 2019 shows sharply lower Tesla sales; even worse than would normally be expected. Car registration data shows similar trends. Will the company struggle as it loses federal tax credits for its buyers?
Read more

Oil Forecasts Risk Black Swans That Make Them Be Wrong

The impact of IMO 2020 on high-sulfur oil and fuel prices was a given – down. Low-sulfur prices would rise boosting exhaust scrubber economics. Sanctions and cutbacks have ruined the forecast.
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Coal-to-Gas Power Plant Switch: Ticket To A Cleaner World?

Natural gas continues to eat into coal's power generation market share. Would a move to convert more coal plants to natural gas be a less costly way of decarbonizing our electricity market?
Read more

The Clock Ticks For A Clearer Energy Picture In Canada

The Alberta election is off and running, and we will soon have an answer to the first of two critical elections weighing on the future of the Canadian oil and gas industry. What's at stake in the votes?
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Will Tesla Show The Need For More Subsidies For EV Success?

This new EV is part of GM's plan to significantly expand its EV line-up

A week ago, General Motors (GM-NYSE) announced plans to add a second electric vehicle (EV) to its Chevrolet line, joining its Bolt. The new vehicle will share some characteristics with the Bolt and will be manufactured at GM's plant in Orion Township, Michigan. GM plans to invest $300 million in the plant and add 400 jobs. This new EV is part of GM's plan to significantly expand its EV line-up and will be the first added before the company's Cadillac line brings forth multiple EVs. The GM announcement was seen as the company's response to criticism from President Donald J. Trump over its decision to end vehicle manufacturing at its Lordstown, Ohio plant.

The new EV will expand the U.S. competitive landscape for clean cars at a time when the field is changing due to the ending of federal tax incentives for EV purchases. It also comes as states are increasing their clean energy mandates, often targeting vehicle emissions in that effort. The U.S. is racing to the inflection point at which either the public fully embraces EVs or it doesn't. Additionally, auto manufacturers must demonstrate they can build and sell EVs at a profit. Tesla may be the canary in this coal mine.

A common characteristic of EV subsidy endings has been a decline in EV sales

In 2018's fourth quarter, Tesla reached the sales threshold triggering the phase out of the $7,500 federal tax credit for EV buyers. For the first half of 2019, Tesla buyers will only be eligible for half the annual subsidy, or $3,750 per vehicle. After June 30, 2019, the federal tax subsidy shrinks in half to $1,875, before completely ending on January 1, 2020. A common characteristic of EV subsidy endings has been a decline in EV sales. This experience has been observed in the U.S. and Europe, and now China is slashing subsidies. When the state of Georgia eliminated its $5,000 credit in July 2015, EV sales fell by 90 percent. Will Tesla experience a similar fate?

For the first two months of 2019, the picture is cloudy. But actions initiated by Tesla, designed to lower the cost of its low-end EVs and improve their profitability, suggest management is cognizant of EV history

For the first two months of 2019, the picture is cloudy. But actions initiated by Tesla, designed to lower the cost of its low-end EVs and improve their profitability, suggest management is cognizant of EV history. Investors promoting Tesla's stock are quick to point out that the company is not experiencing a sales slump, and even if it did, the possible impact on its cash flow and profitability would be limited. Ignoring that issue, what do the latest statistics about EV sales and registrations show?

One of the leading chroniclers of the EV market is *InsideEVs.com*. It collects extensive data about the market. It tracks monthly EV sales by model, including engaging in estimating the monthly sales of Tesla vehicles. Since Tesla only reports its vehicle sales figures quarterly, along with its quarterly financial results, *InsideEVs.com* relies on tracking all forms of intelligence to derive its monthly estimates, truing them against the quarterly results. Over time, the EV market chronicler has become progressively better at estimating quarterly totals based on its monthly sales estimates.

InsideEVs.com has reported its sales estimates for January and February 2019, which raise a number of interesting issues. As Exhibit 1 shows, EV sales in 2018 demonstrated a sharp increase at the end of the year, especially in November and December. Almost every year, reported sales show January to be the low point for the year, which is not surprising given the heavy marketing and incentive programs employed at year-end by car manufacturers and dealers.

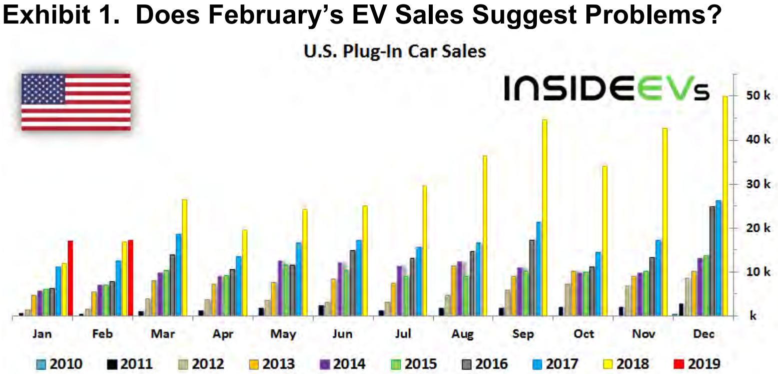
Dealer operations are an interesting aspect of EV sales, something to be watched for their impact on the future of the EV market

Dealer operations are an interesting aspect of EV sales, something to be watched for their impact on the future of the EV market. Buying a car is not the most pleasant experience for most people, as they often dislike the haggling process, which is magnified by the process for most buyers of trading in their existing vehicle, whose value must be established before completing the new vehicle transaction. This unpleasantness has led to the development of some fixed-price dealerships, as well as used car buyers not affiliated with new car dealers, eliminating the paired car transaction with their associated haggling.

EVs are designed with fewer moving parts, so expectations are that the service revenue an EV generates during its life will be substantially less than for an internal combustion engine vehicle

New car sales associates are generally commission-based, meaning their interest is in completing as many sales as possible. Buyers of EVs are coming into dealerships with more questions about the vehicles, adding to the transaction time and forcing sales associates to become knowledgeable about more vehicles. Their employer, the dealership owner, is interested in the new car sales, but generally is more focused on the repair service as that relationship with the car buyer will extend for years, and proves to be more lucrative than the profit earned from a new car sale. This is why dealers are investing significant sums in beefing up their service facilities and waiting rooms, and even adding door-to-door service options for customers. However, EVs are designed with fewer moving parts, so expectations are that the service revenue an EV generates during its life will be substantially less than for an internal combustion engine vehicle. Dealers are marking up new EV sales by $2,000-$10,000 per unit to help offset the expected lost service revenue.

Exhibit 1. Does February's EV Sales Suggest Problems?



Source: ***InsideEVs.com***

February 2019 EV sales were only about equal to February 2018 sales

When we examine the EV sales data for the first two months of 2019, we see that it is substantially below the rates of late 2018. We do see that in January 2019, total sales were above that month's sales in all previous years. February 2019 EV sales were only about equal to February 2018 sales. Is this a sign of impending problems for EV sales this year as Tesla and GM begin losing their federal EV tax credits?

In February, 6,252 Teslas were registered with motor vehicle agencies in the 23 states, compared to 23,310 registered in January 2019

A recent *New York Times* article detailed what it called "Tesla's Pothole Season." The newspaper looked at EV registration data as a sign of potential problems for Tesla. Based on data from Dominion Cross-Sell Report, drawn from state motor vehicle registration records, Tesla's new EV registrations fell significantly from January to February in the 23 states the report covers. Importantly, the states include California, which accounts for about half of Tesla's sales, as well as Texas, Florida and Washington, all big markets for the carmaker. In February, 6,252 Teslas were registered with motor vehicle agencies in the 23 states, compared to 23,310 registered in January 2019. The monthly averages ranged between 13,000 and 17,000 in the fourth quarter of 2018. Importantly, Tesla was scheduled to have its tax credit cut in half starting in January 2019, so it is likely that many more sales were completed in December to be eligible for the full tax credit. This would appear to be true based on California registrations in February that fell to only 2,198 from 15,429 in January.

For the first two months of 2019, Tesla's market share was only 46.6%

When we examined the *InsideEVs.com* monthly sales figures, we see an equally dismal performance so far this year. The sales total for Tesla's three models (Model 3, Model X and Model S) in January and February were 8,325 and 7,650, respectively, which compares with December sales of 32,600 units and November's 24,600 units. To put Tesla's performance, and its importance to the domestic EV industry into perspective, last year the company sold 191,627 units, 53.0% of total domestic EV sales. For the first two months of 2019, Tesla's market share was only 46.6%.

To appreciate the potential impact of the loss of the tax credit on Tesla's competitive situation, GM's Chevrolet Bolt saw its market share in the first two months rise to 6.3% from 5.0% share for 2018. GM is not scheduled to lose its full tax credit until April 1st, when it is cut in half for two quarters before disappearing completely in April 2020.

Sales in the first two months of this year are averaging 5,000 units per month, less than half the 11,000-unit sales rate experienced during the fourth quarter of 2018

A recent EV development involves the Hyundai Kona, a battery electric vehicle. According to *InsideEVs.com*, zero units were sold in January and only 16 in February 2019. An analyst has been tracking this car's global sales and reported that sales in the first two months of this year are averaging 5,000 units per month, less than half the 11,000-unit sales rate experienced during the fourth quarter of 2018. Reporter inquiries of Hyundai have not generated a response. As a result, these EV car reporters are left to speculate

If LG is having a supply issue, is it a company-specific or an industry-wide problem?

on the issue. They believe the high sales rate late last year may reflect an inventory of batteries from LG, Hyundai's supplier, which allowed a large number of cars to be sold. These reporters believe LG may be having a capacity issue, which has caused Hyundai to cut back its sales. As support for this explanation for the sales drop, the reporters point to Hyundai's Ionic EV, which shares the battery and other key components with the Kona. Its monthly sales rate has fallen by a similar percentage as the Kona. According to the analyst reporting Hyundai's sales, 1,000 Ionics were sold in January and 600 units in February, compared to 1,800-2,000 per month sold during 2018's fourth quarter. If LG is having a supply issue, is it a company-specific or an industry-wide problem? LG is one of the industry's leading global battery suppliers. This is an issue to watch.

GM's Bolt sales will provide another test of the dependence of EVs on tax subsidies

This year represents an interesting period in the evolution of the EV market in the U.S. Questions to be answered include whether Tesla can build a low-priced EV to appeal to the mass market? At the same time, GM's Bolt sales will provide another test of the dependence of EVs on tax subsidies. What happens to Tesla's market when more international high-end EVs arrive here? Finally, we may learn more about the importance of expanding the car-charging network for EV sales, beyond urban environments and fleet use.

Oil Forecasts Risk Black Swans That Make Them Be Wrong

Since the Christmas Eve low, West Texas Intermediate has climbed nearly 39% to touch $60 per barrel

This year the oil market was expected to experience a rebound following the terrible fourth quarter when global oil prices fell by 40%. It was a given that last year's collapse was overdone – a result of an explosion of fears about global economic weakness, highlighted by the imposition of U.S. tariffs on world trade, as well as the U.S. political standoff over the Border Wall that led to a lengthy federal government shutdown. Since the Christmas Eve low, West Texas Intermediate has climbed nearly 39% to touch $60 per barrel. Helping drive the recovery has been the agreement between OPEC and Russia to reduce their combined output by 1.2 million barrels per day (b/d). As well, a mandatory 325,000 b/d production cut in Alberta, Canada has helped shrink the oil supply surplus. Sanctions on the oil businesses of Iran and Venezuela, combined with some unplanned outages in Nigeria and Libya, offset output gains in Brazil and the United States.

OPEC's cut has limited the global supply of medium- and high-sulfur crude oil

As positive as the oil outlook appears, the production cut agreements and sanctions have contributed to an unplanned outcome due to the particular quality crude oils that have been most impacted. OPEC's cut has limited the global supply of medium- and high-sulfur crude oil. The Venezuelan sanctions have limited production of heavy crude oil and cut exports to the United States, actually reaching zero last month. The ongoing sanctions against Iran has reduced its heavy crude oil exports despite waivers from the U.S. allowing some flows to Asian countries. Canada's mandatory production cuts have reduced the supply of Western Canadian heavy oil to the U.S. Further complicating the Canadian supply situation was the announcement of a delay in Enbridge Inc.'s (ENB-NYSE) Line 3 expansion that will push as much as 370,000 b/d of oil expected in late 2019 into the second half of 2020. The unplanned outcome of all these developments has been the emergence of a high-sulfur oil shortage, complicating shipper decisions about how best to comply with the International Maritime Organization's (IMO) 2020 new fuel oil rule. The shortage is also impacting refiners, and will ultimately harm consumers as higher transportation costs flow into the economy.

The current high-sulfur crude oil shortage has boosted the value of high-sulfur marine fuel relative to low-sulfur fuel oil

The current high-sulfur crude oil shortage has boosted the value of high-sulfur marine fuel relative to low-sulfur fuel oil. It has also narrowed the premium of light sweet crude oils over heavy sour grades. Neither of these developments were contemplated. The trends are important because they have created a scenario for marine fuel pricing that is contrary to what was assumed last year when the IMO reaffirmed its rule mandating the use of low-sulfur fuel effective January 1, 2020. The conventional view then was that as we moved into 2019, and closer to the fuel switch-over date, low-sulfur fuel oil would rise in value, while high-sulfur fuel oil prices would decline. As that view is failing to play out, although in the longer term it looks like that outcome may still occur, refiners are making operational changes to capitalize on the new trend. Those adjustments may create unforeseen outcomes for the fuel markets.

The capital investment options require shippers to consider future fuel costs, as those play a role in determining payback times used to justify the capital investment

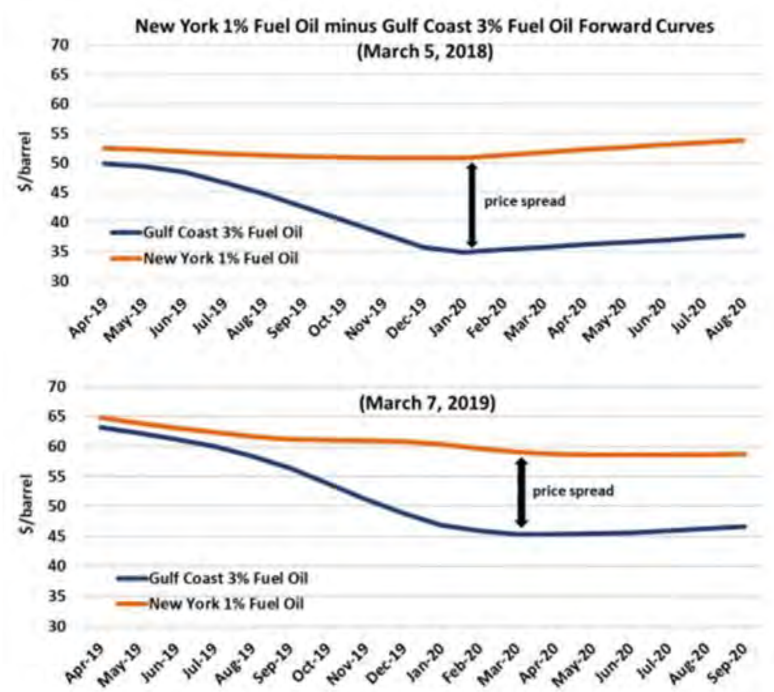
The assumption that there would be a permanent wide price disparity between low- and high-sulfur fuel oils played into the thinking of shipping companies, as they contemplated how best to adjust their operations for the new fuel oil regulation. There are multiple ways shippers can comply with IMO 2020, including switching to low-sulfur marine gasoil, using a compliant fuel made by blending high-sulfur fuel oil with low-sulfur middle distillates, installing exhaust scrubbers to remove the sulfur after the fuel is burned, switching to alternative fuels such as LNG, seeking exemptions from complying with the rule when low-sulfur fuel is not available, and merely failing to comply and counting on lax regulatory enforcement. Each option involves a cost, and in several cases a capital investment. The capital investment options require shippers to consider future fuel costs, as those play a role in determining payback times used to justify the capital investment.

Probably the most challenging investment decision is to employ exhaust scrubbers and continue to burn high-sulfur fuel oil. This option has been selected by roughly 2,500 ships so far, out of an expected ultimate conversion total of 5,000 to 10,000 vessels, or 10%-20% of the global shipping fleet. The economic argument is that installing exhaust scrubbers, at a cost of between $2-$7 million each, assumes that the savings from continuing to burn high-sulfur fuel oil at a lower price will justify the capital investment. A reduced premium for low-sulfur fuel oil means that the expected savings from continuing to burn high-sulfur fuel oil will shrink, stretching out the scrubber capital investment payback period.

Despite higher oil prices now, the spread between the high- and low-sulfur fuel oils is narrower now than projected in 2018

A recent analysis of fuel markets relative to the IMO 2020 rule produced two graphs of interest. The first shows the future price relationship of 1% sulfur fuel oil and 3% sulfur fuel oil as of March 2018 and March 2019, respectively. The two graphs show that despite higher oil prices now, the spread between the high- and low-sulfur fuel oils is narrower now than projected in 2018. It is also interesting to note that last year, the 2020 price spread appeared to widen slightly as the year progressed, while this year it narrows in the latter months of 2020. For those who have bet on the use of scrubbers, their projected payback time horizons are being extended if the March 2019 fuel oil price curve is accurate. That is certainly not a given in the energy market.

Exhibit 2. How Fuel Oil Prices Are Not Following 2018's Plan



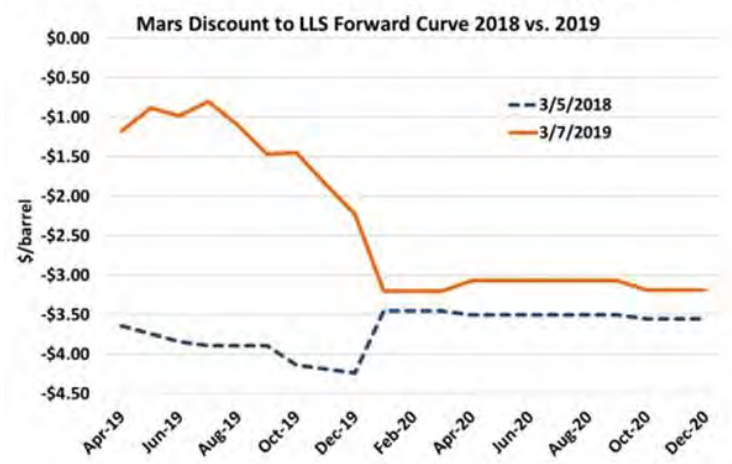
Source: *RBN Energy*

The second chart (Exhibit 3, next page) showed the difference in the forward prices during the 2019 transition year and the initial IMO 2020 year between Mars medium-sulfur crude oil and Louisiana Light Sweet (low-sulfur, light sweet) crude oil as of March 2018 and March 2019. What the graph shows is that the discount between high- versus low-sulfur crude oils on the Gulf Coast expected to have been roughly \$3.50 per barrel, increasing to over \$4, has now

In a business where pennies-per-barrel matter, 50-cents is a huge spread, and a costly proposition for high-sulfur fuel oil buyers

shrunk to $1 per barrel, before expanding to $3 by the end of 2019. For 2020, the discount is projected to be less than forecasted last year, but both projections are within about $0.50 per barrel. In a business where pennies-per-barrel matter, 50-cents is a huge spread, and a costly proposition for high-sulfur fuel oil buyers. The real story, however, is the sharply lower high-sulfur crude oil discount in 2019, primarily due to the high-sulfur crude oil shortage.

Exhibit 3. Gulf Coast Oil Prices Are Tighter Than Expected



Source: *RBN Energy*

That volume will grow as the industry's oil-by-rail investments come online throughout 2020, and likely increase more as new pipeline capacity comes online

It is impossible to know whether the current forward pricing scenarios for high- and low-sulfur crude oils will alter shippers' decisions to order more scrubbers. The concern over the pricing shift for these crude oils is focused in the short-term, while shippers are making much longer-term investment decisions. Will the shortage of high-sulfur crude oil exist for years? Now you are entering the world of speculative thinking about geopolitical developments, as well as oil market trends. One current event contributing to the high-sulfur oil shortage that we know will change by the end of 2020 is the volume of heavy oil being exported from Canada. That volume will grow as the industry's oil-by-rail investments come online throughout 2020, and likely increase more as new pipeline capacity comes online.

The belief is that the significant frontloading of scheduled refinery maintenance work this year is directly tied to the better margins expected later in 2019 as we near the implementation of IMO 2020

Another aspect of this crude oil pricing issue is its impact on the refining industry, and in particular on overseas refineries. Some of what is happening is directly related to the impending IMO 2020 implementation. Data compiled by *Bloomberg* shows that refiners in the Mediterranean and Northwest Europe are arranging to take about 60% less capacity offline for routine maintenance work from September to November than they did last year. *Bloomberg* says a similar trend is likely to occur in the United States. The belief is that the significant frontloading of scheduled refinery maintenance work this year is directly tied to the better margins expected later in 2019 as we near the implementation of IMO 2020. The expectation is that fuel oil prices will surge and refinery margins will widen, so refiners are planning to step up their output by reducing downtime for maintenance in order to maximize profits. Much like how the high-sulfur crude oil shortage has upended pricing expectations, we would be careful about assuming that all refiners will be minting money come 2019's fourth quarter.

The question is how quickly this surplus fuel oil will clog up the distribution channel and potentially force the shutdown of refineries, especially those overseas

Another scenario offered is that with IMO 2020 there will likely be a 40% surplus of high-sulfur fuel oil, according to John Mayes, vice president of Dallas-based consulting firm Turner Mason. The question is how quickly this surplus fuel oil will clog up the distribution channel and potentially force the shutdown of refineries, especially those overseas. Mr. Mayes said that most refineries making high-sulfur fuel oil can only store up to 10-30 days' worth of output in storage tanks. He suggested that unless a refinery has a dedicated customer for this product, it could quickly run out of storage space. That could lead to refineries having to cutback operating rates or even shutdown early in 2020 due to the distribution channels becoming clogged.

Mr. Mayes said that most refineries are taking a "wait and see" approach, which he equated to holding on to a stick of dynamite. "A lot of refineries are placing themselves at the mercy of the market…they don't have a credible plan as to how they're going to react," he told the audience at the AFPM conference, recently. When the audience was quizzed by an IHS analyst at the conference about whether IMO 2020 would be a small, medium or major disruption to their industry, most suggested it would be a medium to major disruption.

The surplus will gradually shrink as refineries upgrade their capacity to produce more low-sulfur fuels

Disruptions are merely distractions as new business opportunities scale up. Dealing with a surplus of high-sulfur fuel oil depends on the time frame. If refineries are going to run out of storage and be forced to trim output or shut down, that product's price will be cut to a level where an enterprising commodity trader will buy it and store it, even offshore in tankers, like crude oil has been for decades. The surplus will gradually shrink as refineries upgrade their capacity to produce more low-sulfur fuels. The challenge will be for those unsophisticated refineries in various parts of the world where upgrades will be much more extensive and time-consuming. If the future economics offer an appropriate reward, they will be upgraded.

To further confuse the outlook, consider the growing supply of lighter oils coming from the shale basins. Exxon Mobil Corp. (XOM-NYSE) is expanding its Baytown refinery to be able to handle its projected light oil output from the Permian basin. Chevron Corp. (CVX-NYSE) has recently purchased a Gulf Coast refinery, with plans for this to become an outlet for its increased Permian production. And the U.S. is now exporting domestic oil, primarily light oil, that exceeds the refinery industry's capacity to process it, adding to the world's supply of light oil. We have yet to see what light oil volumes might emerge from Argentina, Russia and China shale basins. These could have direct impacts on regions of the world that lack the highly sophisticated refining capacity of North America and Northwest Europe.

That trend will directly free up current light diesel fuel consumption that will find its way into the fuel tanks of ships

Lastly, one needs to pay attention to the regulatory push to oust diesel vehicles from the global fleet. That trend will directly free up current light diesel fuel consumption that will find its way into the fuel tanks of ships. All of these trends compound the analyses global shipping companies must undertake in making their decisions about how to comply with IMO 2020. Will there be oil market disruptions ahead? Of course! Will global crude oil prices rise by $2.50 per barrel during the second half of 2019 in response to IMO 2020 as some forecasters are predicting? Maybe it has already happened in the oil price recovery so far this year. Will high-sulfur oil prices fall by $5 per barrel as some forecasters are calling for?

Remember, it is the "unknown unknowns" that create the huge disconcerting price moves in the global energy market

The oil industry will have had 18 months to adjust to an event it knew was coming eventually, it was just not sure it would be 2020. While 18 months might not be sufficient time for the global refining and shipping industries to adjust completely, meaning there will be operational hiccups and unexpected price hikes, this transition will prove to be most disruptive in 2H2019 and 2020, but likely less disruptive later. Remember, it is the "unknown unknowns" that create the huge disconcerting price moves in the global energy market. We call those Black Swans. IMO 2020 doesn't appear to be in that category.

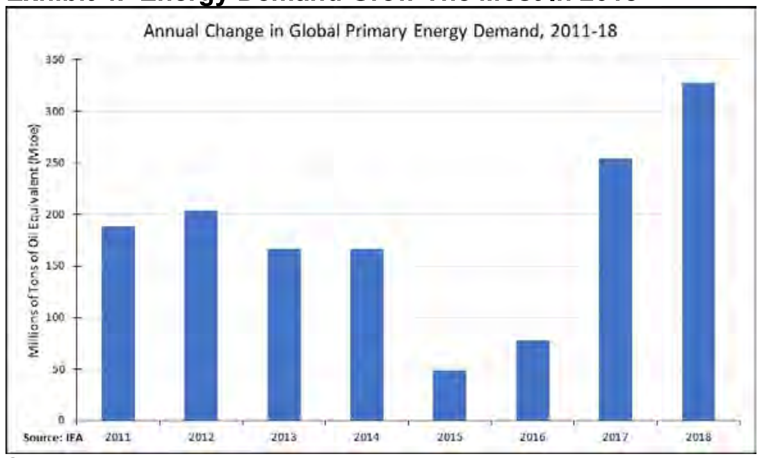
Coal-to-Gas Power Plant Switch: Ticket To A Cleaner World?

Coal continues to account for a significant share of global energy supply, just as it has for centuries. The record of fossil fuel use from 1800 through 2017 is shown in Exhibit 6 (page 12), based on data from Vaclav Smil, the Canadian expert on energy transitions. It shows just how coal went from supplying nearly 100% of the market to now, about a third, but total usage increased by more than threefold.

Since 2011 shows that global energy use has risen every year, with the 2018 showing a 2.3% increase with all fuel categories growing

The International Energy Agency (IEA) data for 2018 confirms that this historical dependency has continued. The data for energy consumption since 2011 shows that global energy use has risen every year, with the 2018 showing a 2.3% increase with all fuel categories growing. Coal accounted for about 9% of the total global energy consumption increase of 238 million tons of oil equivalent (Mtoe) in 2018, which was the largest annual increase experienced during this period.

Exhibit 4. Energy Demand Grew The Most In 2018

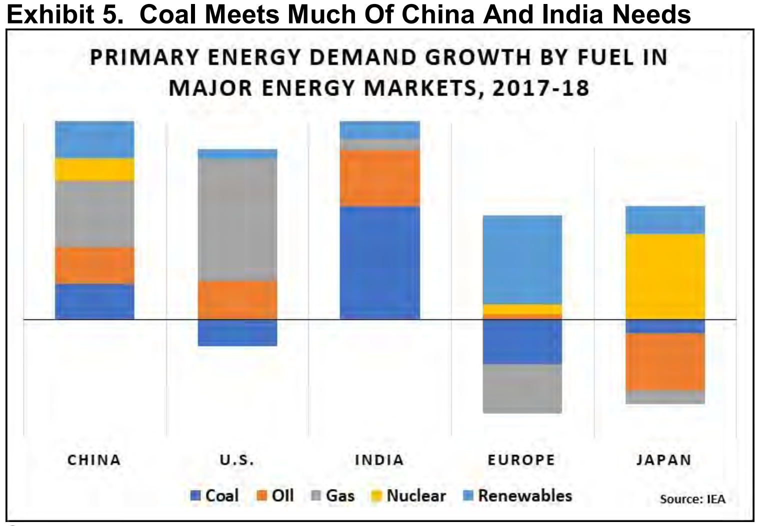


Source: IEA, PPHB

U.S. coal consumption declined by 15 Mtoe, while Europe's use fell by 9 Mtoe, and Japan's was down 1 Mtoe

IEA data also shows that of the five major economic regions, coal consumption increased in two last year – China, by 19 Mtoe and India, by 20 Mtoe. U.S. coal consumption declined by 15 Mtoe, while Europe's use fell by 9 Mtoe, and Japan's was down 1 Mtoe. What the IEA is most concerned about is that the energy consumption increase, with little improvement in energy efficiency, carbon emissions rose by 1.7% in 2018.

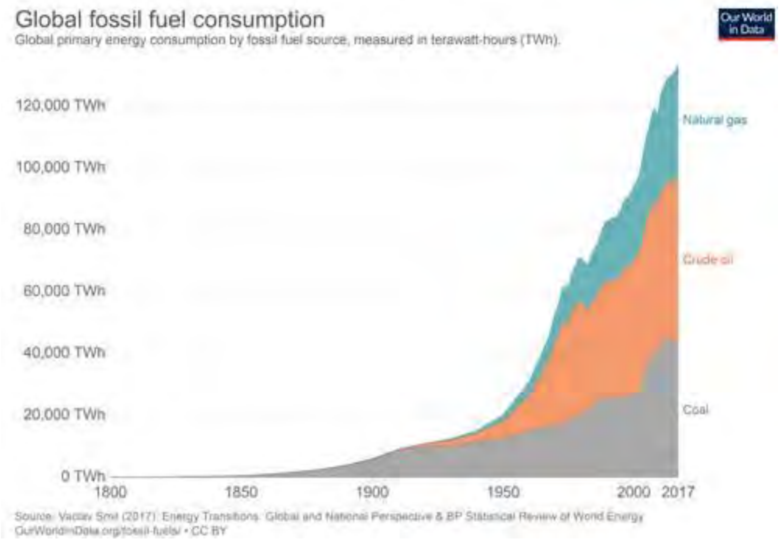
Exhibit 5. Coal Meets Much Of China And India Needs



Source: IEA, PPHB

As we see from Dr. Smil's data, global coal consumption actually declined in recent years. The IEA's 2018 data suggests the dip in coal consumption may have been reversed, though, sending chilling thoughts through the minds of those concerned about the impact on climate change caused by more carbon emissions, especially from increased coal use.

Exhibit 6. History Of Global Fossil Fuel Use



Source: Vaclav Smil

We were shocked to read a headline highlighting a new underground coal mine being opened in the United Kingdom

We have written about the growing use of coal in India, the country demonstrating the most rapid growth in energy consumption. With rapid economic growth in India and China, and given their large populations, the appropriate energy fuel mix for meeting their energy needs while at the same time improving their air quality has become a significant challenge. Our most recent article about the coal industry and India's consumption was triggered by the government's announcement of the opening of its 50th coal mine to meet electricity generation demands. Recently, we were shocked to read a headline highlighting a new underground coal mine being opened in the United Kingdom, a nation firmly committed to decarbonizing its economy by 2050.

The three million tons of coal output per year will release carbon emissions when it is burned

It turns out the UK coal mine, the first deep mine in 30 years, will be providing fuel for the nation's steel industry, not generating electricity. However, the three million tons of coal output per year will release carbon emissions when it is burned. According to Scientists for Global Responsibility, the output will contribute nine million tons of carbon dioxide to the atmosphere every year for 50 years, which is equal to the emissions of a million households.

The new underground mine will be located in the county of Cumbria that was created in 1974 through the amalgamation of the counties of Cumberland, Westmorland, as well as parts of Lancashire and Yorkshire counties. The mine is located in the area on the map in Exhibit 7 (next page) labeled Cumberland on the northwest coast of Britain, and in the midst of one of the country's historical coal-producing regions.

Exhibit 7. Where UK's New Coal Mine Will Be

Source: ***Wikipedia***

They are especially shaken it could happen, as the national government was hinting it would adopt a target of zero greenhouse gas emissions by 2050

As expected, UK environmentalists were upset with the local government's planning commission's approval of the mine. They are especially shaken it could happen, as the national government was hinting it would adopt a target of zero greenhouse gas emissions by 2050, up from the current 80% reduction goal. With emissions from this new mine coming online, attention is shifting to possible steps the government, and others, might take to reduce carbon emissions as an offset to the new source. This quest raises the question of whether there are less costly ways of reducing carbon emissions than trying to totally repower the global economy with renewable power, which is not technically feasible despite climate scientist claims.

Since 2005, emissions have fallen 14% through 2017

The one highly industrialized economy that has been successful in reducing its carbon emissions has been the United States. Prior to 2005, carbon emissions in the U.S. grew steadily each year. Since 2005, emissions have fallen 14% through 2017 (latest data available). This is largely due to the decline in coal's share of electricity generation, which fell from 50% to 30% during this time period. Natural gas's share increased from 19% to 32%, while wind and solar, combined, saw their share of the power generation market grow from 2% to 10%. The carbon emissions reduction is due to the increased use of lower carbon fuels, primarily natural gas. According to the Energy Information Administration (EIA), natural gas emits only 117.0 pounds of CO_2 per million British thermal units of energy compared to coal, which, depending on the type of coal used, emits carbon volumes ranging anywhere from 205.7 to 228.6 pounds. Clearly, using natural gas to generate electricity produces a cleaner environment than generating it from coal. That raises the question of whether the world should be more focused on ridding coal's use for power generation by replacing it with natural gas?

The coal-to-gas conversion has been underway for a number of years, largely via closing aging coal-fired power plants and replacing them with newly-built gas-fired ones. In a number of cases, coal-fired plants have been converted to burn fuel rather than being torn down. Could this be done on a massive scale? The short answer is: Possibly.

While coal conversions are possible, the issues to be considered before figuring out the economics of such a fuel switch are extensive

We have spent time examining this option, including reaching out to people who have actually done such conversions. No one is willing to talk about the economics of the conversion, largely because it gets into profitability issues, which managements are unwilling to divulge to outsiders. To attempt to uncover the economics, we scoured public financial reports, as well as read articles by technical people involved in power plant conversions. While coal conversions are possible, the issues to be considered before figuring out the economics of such a fuel switch are extensive. They range from whether natural gas supply is easily available to whether the boiler generates sufficient heat to drive the production of electricity?

It is interesting that one doesn't see many power plant conversions today, suggesting that the economics of such an effort are not as attractive as merely closing a coal-fired plant and constructing a gas-fired replacement. To some degree that may reflect the changing nature of the ownership of power plants, how electricity is sold, and commodity prices.

An interesting case study was the conversion of the Joliet coal-fired power plant 40 miles outside of Chicago, Illinois, owned by NRG

The gas-fired plant has become a seasonal power supplier rather than a base-load one

Energy, Inc. (NRG-NYSE). The conversion was done in 2016, and, according to officials with NRG, was done in response to the need to meet the Environmental Protection Agency's (EPA) Mercury and Air Toxics Standards (MATS), and not the Clean Power Plan. Like other coal plant conversions, the Joliet plant utilized much of the existing infrastructure, but produces less pollution, employs fewer workers and creates a different set of economics. The gas-fired plant has become a seasonal power supplier rather than a base-load one. That switch reflects the difference in electricity economics. At that time, natural gas cost more than coal, but during winter and summer, when demand soars, so do prices, creating a profit opportunity for Joliet. Today, fuel pricing is different, but the Joliet plant remains a peaking unit.

Exhibit 8. NRG's Joliet Coal-to-Gas Converted Plant

Source: ***Wikipedia***

The parent company had filed for bankruptcy in 2012, and the sale of the generating assets was part of a reorganization plan for dealing with the company's $3.7 billion of debt

The Joliet plant actually consists of two operating units on opposite sides of the Des Plaines River. A coal conveyor actually crossed the river allowing fuel to be moved from the larger facility on the left side of Exhibit 8 to the plant on the right side. The Joliet plant is composed of three generating units – Joliet 6, 7 and 8. The plant was acquired in 2014 by NRG as part of the assets of Edison Mission Energy (EME), a subsidiary of Edison International. The parent company had filed for bankruptcy in 2012, and the sale of the generating assets was part of a reorganization plan for dealing with the company's $3.7 billion of debt. EME's assets included: 1,700 megawatts (MW) of wind; 1,600 MW of gas-fired capacity; 4,300 MW of coal-fired capacity and 400 MW of oil and waste coal-fired capacity. NRG also bought Edison Mission Marketing and Trading. The purchase price of the assets was $2.64 billion. The purchase price equated to $330,000 per MW of power, assuming all MWs are valued equally, and giving no value to the marketing and trading operation.

Joliet 6 was built in 1959 and had the capacity to generate 290 MW of power. Joliet 7 and 8 were built in 1965 and 1966, respectively, and were each sized for 518 MW. The combined 1,326 MW of power generating capacity at Joliet, based on the EME purchase

That suggests our purchase price valuation would put Joliet's value at roughly 55% of the 2010 net book value

price, suggests the plant was worth $427.6 million. In a Securities and Exchange filing by EME's subsidiary Midwest Generating LLC in 2010, the Joliet plant was listed with a net book value of $771 million. That suggests our purchase price valuation would put Joliet's value at roughly 55% of the 2010 net book value. Given the change in the power generation market, the environmental challenges the plant faced, and the bankruptcy status of the parent, this seems like a reasonable valuation.

An observation about the economics of a converted plant is that the cost to generate electricity is higher than using coal because the heat output of gas is lower than coal

From public records, the Joliet plant conversion cost NRG $205 million. It involved acquiring rights-of-way and installing two gas pipeline connections to ensure that if one line was busy supplying gas to homeowners for heating, the plant would still have gas supply. While the coal handling equipment is now rendered obsolete, the existing generating equipment required no modifications and operates today as it did when its fuel was pulverized coal. An observation about the economics of a converted plant is that the cost to generate electricity is higher than using coal because the heat output of gas is lower than coal, but as a seasonal power supplier, the plant only operates when power demand and prices are high making the plant profitable. It would not be economic if it operated as a base-load power supplier and electricity prices were low.

A new natural gas-fired auxiliary boiler and new natural gas-fired fuel heaters were constructed to support the operation of the existing boilers on natural gas

At the time of the 2010 SEC filing, the Joliet units were listed as having 19-20 years of remaining life. At the time of their conversion, they had 13-14 years of remaining life. More importantly, the fuel switch meant a 99.9% reduction in sulfur dioxide, 97% less particulate matter, 34% less nitrogen oxides and a reduction in carbon emission. The air permit application for the plant conversion stated that various existing emission control equipment was no longer needed, but a new natural gas-fired auxiliary boiler and new natural gas-fired fuel heaters were constructed to support the operation of the existing boilers on natural gas. While costly, we noted that NRG spent $100 million for new emissions control equipment at a comparably-sized coal-fired plant in Illinois to meet EPA rules, nearly half of the Joliet conversion cost.

Another cost savings is in the labor necessary to operate the plant. Total plant employment dropped from 151 to 54, with 11 people laid off, 51 taking early retirement with incentives, and 37 transferred to other power plants. Utility company employees have always been well-paid, with substantial benefits and retirement plans.

At the time of this conversion, as well as others that were converting to meet the MATS rule, Scott Gossard, general manager of service projects at Babcock & Wilcox Power Generation Group, a major gas conversion vendor and equipment supplier, wrote about the market. "The most likely candidates for a coal-to-gas conversion are 50-plus year-old units, less than 300 megawatts in capacity and generally early generation sub-critical utility boilers – the least efficient, most

Given this profile, approximately 46% of U.S. power plants are nearly 50 years old or older

costly to operate and with the lowest overall capacity factor in the coal fleet. Most plants west of the Mississippi River built in the 1960s or later aren't as attractive as candidates for fuel switching since they are often larger, more efficient and tend to burn Lower River Basin coal, a cost-effective fuel with a more favorable emission profile than the bituminous burned by many eastern plants." Given this profile, approximately 46% of U.S. power plants are nearly 50 years old or older. Estimating the cost to keep them operating after a fuel conversion plays a significant role in calculating the plant's future economic returns.

As every technical article we read discussing fuel conversions pointed out, each project is different and requires an extensive analysis before reaching a conclusion

With an investment of roughly 50% of the value of an operating coal-fired power plant, the benefits of converting to natural gas for fuel can make economic sense, based on our estimates. However, as every technical article we read discussing fuel conversions pointed out, each project is different and requires an extensive analysis before reaching a conclusion. We will not bore you with the extended lists of issues to be considered. Natural gas makes for a cleaner environment and operating facility, and also requires less ongoing maintenance. Gas plants are also less labor intensive, which may become a greater consideration in the future with a tighter labor market and an aging labor force.

A global coal-to-gas conversion effort is not likely, even though we suspect many more switches could (may) be justified

Given the amount of natural gas resources in the world, it would be nice to say that this conversion option is a panacea for the expensive decarbonization efforts currently being proposed. A global coal-to-gas conversion effort is not likely, even though we suspect many more switches could (may) be justified. As the economics of the Joliet conversion highlights, the plant moved from a baseload to peaking status, which could be justified by current energy economics. We doubt all regions have similar economics that facilitate such a move. The world will continue to remain dependent on an "all of the above" energy slate for ensuring everyone has access to cost-effective electricity.

The Clock Ticks For A Clearer Energy Picture In Canada

This is likely to be an ugly and divisive battle between the New Democratic Party, led by Ms. Notley, and the new United Conservative Party, headed by Jason Kenney

The first of two seminal political battles to be waged in Canada this year, which will likely shape the country's economy and its energy business for the foreseeable future, has commenced. Two weeks ago today, following the previous day's Speech from the Throne, delivered by Lt.-Gov. Lois Mitchell outlining the accomplishments of Premier Rachel Notley's government over the past four years, the announcement of the next election was made. The election will be on Tuesday, April 16th. This is likely to be an ugly and divisive battle between the New Democratic Party (NDP), led by Ms. Notley, and the new United Conservative Party (UCP), headed by Jason Kenney, formerly a federal cabinet minister under former Prime Minister Stephen Harper, if the early skirmishes prove representative.

The UCP was formed in 2017 via a merger of the Progressive Conservative Association of Alberta and the Wildrose Party, a highly conservative force in the province. This will be the new party's first election battle, and it begins with having to fight claims of being tainted with racism from Premier Notley and her supporters. One of the early examples of the supposed racism involved a rising female star within the UCP who was standing for election from Calgary for a seat in the Alberta Legislature. Caylan Ford, resigned from the race following the leaking of private messages to *CBC News* that reflected what were considered racist views about the LGBTQ community and white supremacist terrorists. While the private quotations were taken out of context, in today's highly charged society, there is little room for academic debates over social issues. That episode developed following the prior weekend's revelation that Alberta's Office of the Election Commissioner had turned over to the Royal Canadian Mounted Police (RCMP) its investigation into allegations of irregular political contributions to the Jeff Calaway campaign during the UCP's leadership race in 2017. At issue is whether there was a conspiracy between the Kenney and Calaway factions to undercut the efforts of former Wildrose Party leader Brian Jean in the battle for the UPC leadership. The conspiracy reportedly involved Mr. Kenney helping Mr. Calaway's campaign to hurt Mr. Jean's efforts, with Mr. Calaway planning, all along, to withdraw and shift his support to Mr. Kenney. Not sure this isn't pure politics.

This will be the new party's first election battle, and it begins with having to fight claims of being tainted with racism from Premier Notley and her supporters

At the present time, the polls show the UCP well ahead in the campaign, even though Ms. Notley has history on her side. Governing Alberta has been marked by long periods of almost dynastic rule by one or another party. The record shows that no party, who sought re-election after first achieving the leadership position, has ever been defeated. But these are different electoral times, both in Canada and globally.

The provincial election will be fought over divergent views of how the province should operate. The NDP plans to continue its liberal bent by spending on education and health. It would also build and retrofit highways, schools, hospitals and health centers. A continuation of the current tax regime and government program incentives (legal aid, senior assistance, day care) form key parts of the election platform. This would include the planned C$3.7 billion spending for rail cars to boost oil exports from the province, while also continuing the carbon tax. So far, this agenda has led to four years of annual spending deficits, pushing Alberta's debt to C$60 billion, with a balanced budget only arriving in 2023.

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The conservative UCP platform would roll back the prior corporate tax increases, end the carbon tax, while also freezing the minimum wage increases, repeal rules on statutory holiday pay, and allow young workers to be paid less than their adult colleagues. The UCP would also eliminate the injury compensation program for farmers, replacing it with one giving more freedom of choice in insurance

While seeking to end the carbon tax, the UCP has yet to reveal how it would deal with carbon emissions

programs and exemptions for small farms. While seeking to end the carbon tax, the UCP has yet to reveal how it would deal with carbon emissions. It could resort to an old plan to tax "large emitters" to fund R&D for cleaning up the atmosphere. The UCP platform includes many actions that are conservative, free enterprise policies, which have often appealed to the rugged independence of westerners. However, with growing migrant populations and an increasing number of young liberals, Alberta's political needle is no longer as sharply tilted to the right as it once was. One recent political forecast suggests the NDP will handily win the vote in and around Edmonton, the province's capital, but lose everywhere else, making Mr. Kenney of the UCP the next premier of Alberta.

It hopes such a victory will improve the regulatory and economic environment for energy, which accounts for roughly 30% of the province's economy and supports 415,000 jobs

As one would expect, the energy industry is cheering for a UCP victory. It hopes such a victory will improve the regulatory and economic environment for energy, which accounts for roughly 30% of the province's economy and supports 415,000 jobs, according to an analysis prepared by the Canadian Association of Petroleum Producers (CAPP). A UCP victory envisions a push for accelerated construction of the nation's oil and gas pipeline network, critical for sustaining the growth of Canada's oil and gas industry. The pipeline battle involves gaining the support of the federal government, as well as the British Columbia provincial government.

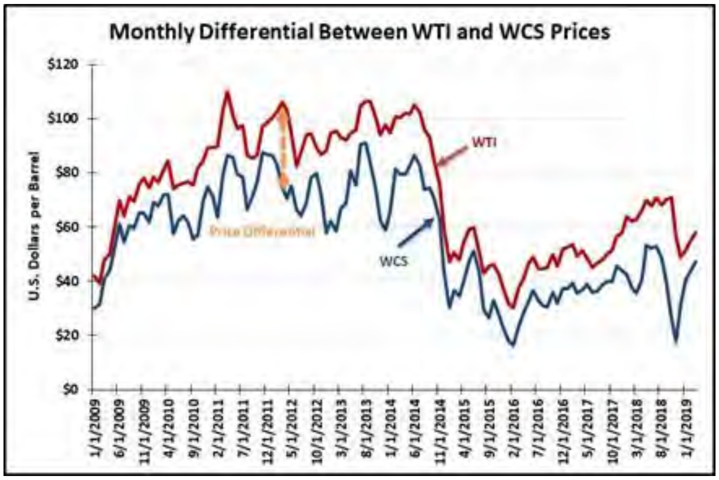
Ms. Notley, in her first campaign speech in Calgary, spoke about the pipeline issue. She told the audience, "I think that we will get it built. I will keep talking to Canadians. I will keep pushing people in B.C. I will keep pushing the federal government and we will make damn sure that thing gets built. It is fundamental to Albertan's futures and to Canadians."

Mr. Kenney has proposed a taxpayer funded "war room" to defend Alberta's energy industry here and abroad from unfair criticism. That might even involve setting up satellite offices. He would also appoint a minister of deregulation, tasked with reducing regulations by one-third across all ministries. Unfortunately, there is little more Mr. Kenney can do about getting more oil out of the province than Ms. Notley is already trying. As a result, the campaign will be over governmental attitudes toward energy in the future.

The mandatory production cut the Notley government instituted at year-end has largely been successful, if lifting the wellhead price was its key objective

The mandatory production cut the Notley government instituted at year-end has largely been successful, if lifting the wellhead price was its key objective. From the day the output restriction was announced, the wellhead price began rising, shrinking the discount between Western Canadian Select (WCS) and West Texas Intermediate (WTI) prices. What once was a discount of as much as $50 per barrel has shrunk to more traditional levels of $20. It has even dropped to as low as $12 per barrel as demand for Canada's oil has grown given the loss of Venezuelan oil for U.S. refiners. The differential has varied widely over time.

Exhibit 9. How Canada's Oil Differential Has Varied



Source: ***Oil Sands Magazine*****, PPHB**

Planned reductions of 25,000 b/d were announced for May and June, bringing June 1st production back to 3.71 million b/d, or 150,000 b/d higher than January's ceiling of 3.56 million b/d

The production cutback started at 8.7% of average output, or 325,000 barrels per day (b/d) across all producers with the exception of those with total output below 10,000 b/d. With prices recovering and demand growing, the production cut has been reduced. Planned reductions of 25,000 b/d were announced for May and June, bringing June 1st production back to 3.71 million b/d, or 150,000 b/d higher than January's ceiling of 3.56 million b/d. The government's plan is for the production cut to be steadily reduced to 95,000 b/d during the second half of 2019. That target was originally established when it was anticipated that Enbridge Inc.'s (ENB-NYSE) replacement Line 3 pipeline would be in service. The project's startup has been delayed into 2020, so export growth will depend on pipeline debottlenecking and additional oil-by-rail capacity. The progress in closing the price differential is seen in Exhibit 10. Currently, the oil price discount is based on pipeline export economics, making rail export unprofitable for producers.

Exhibit 10. Mandatory Production Cut Has Lifted Prices

Source: ***Oil Sands Magazine*****, PPHB**

Influencing the election will be the state of the current political scandal engulfing Mr. Trudeau, and having to do with his government's reported tampering with the possible criminal prosecution of the engineering and construction firm, SNC-Lavalin, a major employer headquartered in Quebec

The health of Canada's energy industry and expansion of the nation's oil and gas export pipeline capacity highlight a key issue in the second seminal political event of this year – the federal election this fall. Canadians will be considering whether to re-elect current Prime Minister Jason Trudeau's Liberal Party. Influencing the election will be the state of the current political scandal engulfing Mr. Trudeau, and having to do with his government's reported tampering with the possible criminal prosecution of the engineering and construction firm, SNC-Lavalin, a major employer headquartered in Quebec. The RCMP charged the company with corruption for allegedly paying various Libyan government officials nearly $48 million in bribes, and defrauding other Libyan entities to the tune of nearly $130 million, between August 2001 and September 2011. Former employees of the firm have also been charged.

At the moment, the prime minister, as well as the Prime Minister's Office, are under ethics investigations for violations of Canada's Conflict and Interest Act. Four cabinet officials have resigned so far related to the dispute. This has weakened support for Mr. Trudeau, even in his strongest areas. What is unknown is whether more bad news emerges, or the issue disappears from the headlines, although it will be used against Mr. Trudeau in the election campaign. How damaging the scandal may be is impossible to determine at the present time.

A British Columbia court is hearing a suit that would grant the province veto power over what and how much oil and gas might be moved through pipelines crossing its territory

While there is much media attention directed at the SNC-Lavalin scandal, out west the issue of pipelines and energy are key. The delay in Enbridge's Line 3 has set back the production outlook. Legal challenges over early construction of parts of the Keystone XL pipeline has set that line's opening back by likely a year. Then we have the battle over the reconsideration of the environmental approval and indigenous peoples' consultation over the Trans Mountain pipeline expansion. A British Columbia court is hearing a suit that would grant the province veto power over what and how much oil and gas might be moved through pipelines crossing its territory. The federal government is fighting any restriction of a federally-approved pipeline, but the question opens up the entire issue of the federation that created Canada. This is being closely watched as energy people are keen to understand the Trudeau government's support for the industry, especially as the environmental movement provides key constituent support for the Liberal Party that will be very important in the fall election.

The energy industry is closely watching what else the Trudeau government embraces heading into the election

Until these issues are resolved and additional pipeline export capacity is built, Canada's oil and gas industry is dependent on increased rail capacity to move additional oil volumes. Energy companies, as well as the Alberta government, are in the process of adding rail capacity by several hundreds of thousands of daily barrels of takeaway capability. At the same time, the energy industry is closely watching what else the Trudeau government embraces heading into the election, with the budget giving hints.

The new budget targets the demographic groups that supported the party in 2015 and will be crucial for winning in 2019

For the fourth budget, the Liberal government has favored "investment" spending over debt reduction. Having promised in 2015 that annual deficits would not exceed $10 billion, except in a sluggish economic environment, the deficit will likely approach $20 billion for each of the next two fiscal years. The new budget targets the demographic groups that supported the party in 2015 and will be crucial for winning in 2019. First-time home buyers' credits are a goody being proposed. Another is to support journalism, allowing it to achieve "qualified donor status" that would make them charities. As part of that move, personal tax credits of 15% of annual digital subscriptions of up to $500 in value, or a tax credit of $75, will be allowed.

Buried in the budget is a tax credit for buying electric vehicles (EV). A $5,000 credit against a vehicle with a MSRP of $45,000, or less, would be available to buyers. Cynics have pointed out that the top price point would be below that of the cheapest Tesla, Inc. (TSLA-Nasdaq) model sold in Canada. One wonders how quickly Tesla will cut the cost of its car to meet the EV credit threshold? At the present time, the price cap would allow a credit for buying a Chevrolet Bolt or a Nissan Leaf. It is possible that new automobile models will be introduced that will fall under the tax credit ceiling.

E&P producers are expected to adhere to living within their cash flows this year, which becomes a constraint on oilfield activity

Recent forecasts project Canada's energy industry will experience a modest recovery in its oil price, but not much improvement from currently depressed levels for AECO gas prices. Drilling activity will be down from last year, with a slow recovery projected over the next three years. E&P producers are expected to adhere to living within their cash flows this year, which becomes a constraint on oilfield activity. This outlook, coupled with the impasse over the timing of any oil export expansion and lingering questions overhanging the recently announced LNG projects, has energy investors redlining investments in Canada's oil patch. Barring a dramatic change in oil pricing, there are few reasons for investors to become excited about energy investments in Canada in the foreseeable future.

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PPHB is an independent investment banking firm providing financial advisory services, including merger and acquisition and capital raising assistance, exclusively to clients in the energy service industry.