



MUSINGS FROM THE OIL PATCH

May 28, 2019

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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:

Understanding What Different Water Means For Energy

We think we understand what environment we are in at any time, but we must always be ready for it to change. This may be extremely true for the energy sector given current events.

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Electric Vehicles, Transportation And The Oil Market

The most aggressive forecaster of EV success has boosted its prediction, which will create challenges for the transportation sector, and in turn, the oil market. We study these changes.

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The Challenge Of Getting To Rhode Island

Our annual trip to our summer home seemed to be much slower than usual, but we weren't sure why. It may have been related to the challenges we faced traveling to Houston from Calgary the prior day.

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Sorting Out The Confusing Forces Shaping Oil Prices

Oil prices have suddenly hit a speed bump. This comes from worry about demand as well as supply. Those issues are disrupting discussions over continuing the output cut of OPEC+.

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An Intriguing Solar Power Device

Smartflower, a stand-alone solar panel unit that opens and closes each day and tracks the sun's movement, is more efficient, but still can't beat a fixed installation in North Carolina.

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The next issue of *Musings From the Oil Patch* will not be delivered until Tuesday, June 18 due to international travel.

Understanding What Different Water Means For Energy

Investment newsletter writer John Mauldin began a recent issue with a joke.

There are these two young fish swimming along, and they happen to meet an older fish swimming the other way, who nods at them and says, "Morning, boys, how's the water?" And the two young fish swam on for a bit, and then eventually one of them looks over at the other and goes, "What the hell is water?" (David Foster Wallace, [This Is Water](#))

Energy is looked at differently elsewhere than in Houston, and if you don't appreciate that fact then you may have problems

The point of the joke is that we are always in water – it's just that the water can change and we better be prepared to adjust. The joke reminded us of a comment by a BP plc (BP-NYSE) lawyer speaking at the recent Baker McKenzie energy conference in Houston. He said that energy is looked at differently elsewhere than in Houston, and if you don't appreciate that fact then you may have problems. The same can be said for most political positions, as well as climate change, which is being renamed because it doesn't convey the need to act immediately. The water changed for climate change a week ago in Australia.

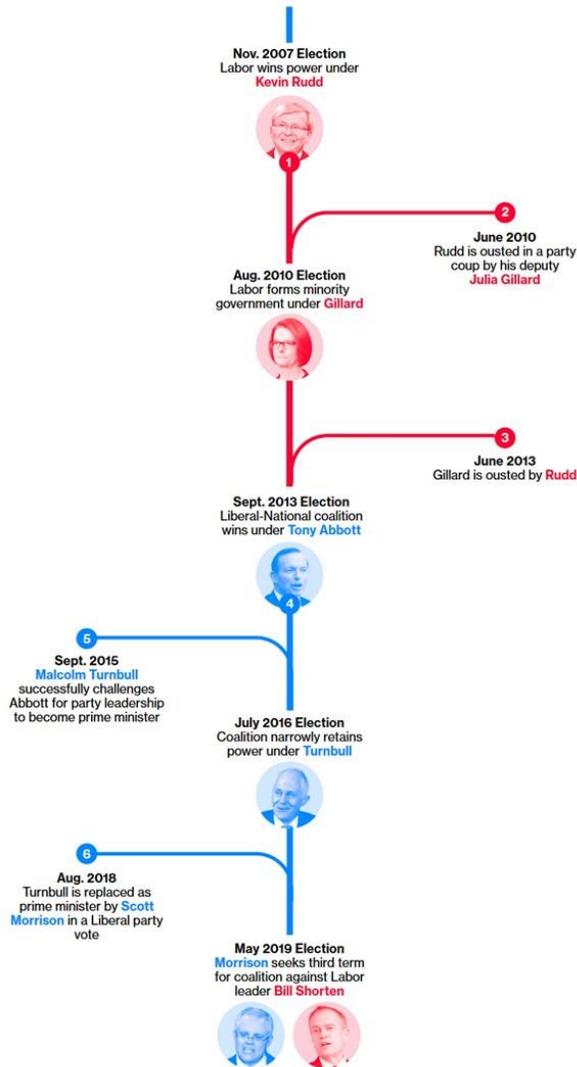
Possibly the greatest comeback in Australian political history

Down under, the election resulted in the re-election of Prime Minister Scott Morrison of the Liberal-National Coalition. His victory over Bill Shorten, the leader of the Labor Party, is considered not only a shock, but possibly the greatest comeback in Australian political history. Heading into the election, held every three years, the Coalition led Labor 73-72. The Liberal-National Coalition held the Prime Minister position as a result of support from independent parties. A poll published on election-morning projected Labor

Polls had Labor at a 52-48% advantage, although other polls had the spread as much as eight percentage points in Labor's favor

winning 82 of the 151-seat Senate, which would have given them overwhelming control. Polls had Labor at a 52-48% advantage, although other polls had the spread as much as eight percentage points in Labor's favor, which, if accurate, would have ended Coalition's six years in office. The history of Australia's political leadership has been turbulent over the past decade as reflected in the accompanying chart.

Exhibit 1. Recent History Of Australia's Leadership



Source: *The Australian*

As the votes were tallied throughout the evening, it became evident that the predicted outcome wasn't happening

As the votes were tallied throughout the evening, it became evident that the predicted outcome wasn't happening. By midnight, with five seats undecided and over four million early votes yet to be counted, Mr. Shorten conceded the race. The only question remaining was whether the Coalition would win a majority. By Monday, the election officials had awarded the Coalition three of the five previously undecided seats, and the vote counts suggesting it was leading in the remaining races. If it wins those seats, the Coalition will have an 80-seat majority, having nearly completely reversing the pre-voting poll predictions.

The other explanation is that voters, even after voting, lied to the pollsters about their intentions and actions

The stunning upset has been attributed by liberal-leaning media to the rightward shift of global politics evident since the UK's Brexit vote in mid-2016. This may be true if one considers the uniqueness of Australia's election dynamics. Eligible voters are required to vote, or pay a fine of A\$20 (\$14). As a result, the prior nationwide election registered a 95% voter turnout. This means that polling in Australia is less about the art of structuring the sampling population, and more about the accuracy of those sampled. The pollsters are already claiming that the lack of landlines made the polls less reliable, which may be true. The other explanation is that voters, even after voting, lied to the pollsters about their intentions and actions. Malicious or a backlash?

The Labor Party's campaign was based on dealing with climate change and income inequality, while Mr. Morrison made the election about economic issues

The Australian election was touted to be the most significant climate election in modern times. The Labor Party's campaign was based on dealing with climate change and income inequality, while Mr. Morrison made the election about economic issues – the economy, wages, taxes, and the expansion of Australia's natural resource assets. The Labor Party promised to cut carbon emissions nearly in half by 2030 compared to 2005 levels while also subsidizing wind and solar power. It also opposed a new coal mine in Queensland that would have generated significant job growth. Labor's candidates in that province were routed. All of this would have come on top of hiking taxes on "wealthy" Australians. This election platform made *The New York Times* headline "In Australia, Voters Didn't Prioritize Eco Issues" disingenuous. The voters were presented a clear choice and they voted their pocketbooks! One can say the political waters in Australia changed dramatically, which will translate into a different political and economic outlook, at least for the next three years, then envisioned merely hours earlier, much like Donald Trumps' election victory over Hillary Clinton and the Brexit vote.

"Lower for longer" became the mantra for how oil executives needed to guide their enterprises

What about the energy waters? The first sea change was late 2014 when Saudi Arabia engineered a radical shift in the global oil market. "Lower for longer" became the mantra for how oil executives needed to guide their enterprises, and overshadowed the energy space. While oil prices rebounded from their dramatic lows in February 2016, the history of price recoveries being sabotaged by producer greed or geopolitical pressures weighed on the performance of energy equities. The past four years of energy equities' underperformance has driven investors to abandon the sector, or to become more demanding of how energy executives managed their enterprises.

Today, "lower for longer" has been supplanted by "capital discipline" as the guiding principle for managing energy companies

Today, "lower for longer" has been supplanted by "capital discipline" as the guiding principle for managing energy companies. Recent results suggest exploration and production companies are adhering to the new mantra, but some of that success may have resulted from the oil price crash during 2018's fourth quarter, which caused managements to become overly cautious about spending. Initially,

producers estimated their capital spending in 2019 would increase 1-3%. Even though oil prices recovered rapidly in early 2019, many E&P spending budgets were revised lower as managers realized investors would trash the shares of producers who increased spending. A recent report by analysts at Cowen & Co. highlighted how some E&P company budgets were being cut this year.

Exhibit 2. Capital Discipline Guiding E&P Spending

Figure 4 2019 Budget Revisions (\$MM)

	2018	Initial 2019	YoY	Revised 2019	YoY	Revision %
Abraxas	171	95	-45%	86	-50%	-9%
Antero	1,744	1,375	-21%	1,338	-23%	-3%
CNX	974	775	-20%	920	-6%	19%
Comstock	429	364	-15%	318	-26%	-13%
Laredo	575	300	-48%	400	-30%	33%
Total	3,893	2,909	-25%	3,062	-21%	5%

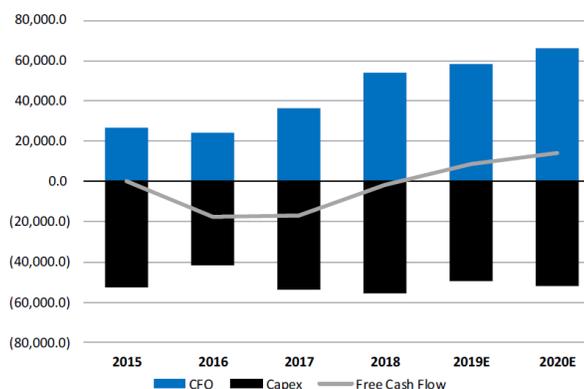
Source: Cowen

In 2019, capital spending for this group of companies will decline from what was spent in 2017 and 2018

Based on Cowen’s oil price and production forecasts, it sees cash flow for their E&P research universe growing in both 2019 and 2020. In 2019, capital spending for this group of companies will decline from what was spent in 2017 and 2018. This will enable the group to generate free cash flow (FCF) in 2019. Even with a small increase in spending next year, based off of higher revenues, the group generates more FCF.

Exhibit 3. How E&P’s Are Becoming FCF Positive

Figure 10 Cowen E&P Coverage Capex vs. Cash Flow 2015-2020E



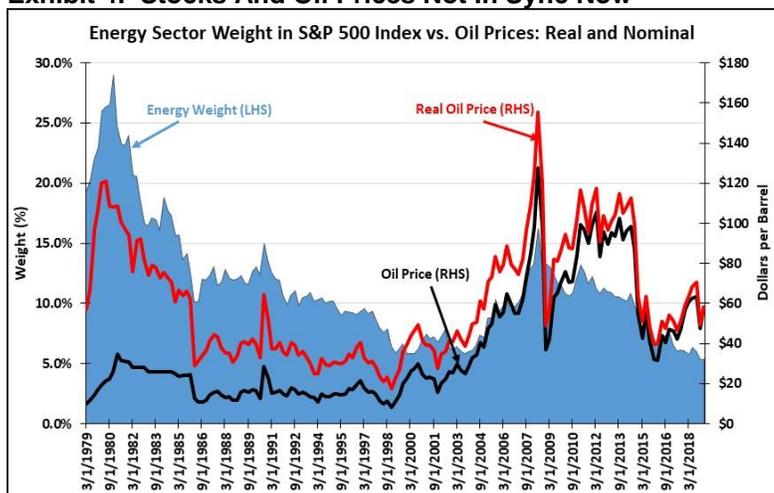
Source: Cowen

Investors haven’t yet given greater value to those companies successfully embracing the new mantra

The Cowen analysts emphasized that this embrace of capital discipline by E&P companies was still young – only in its second or third quarter. That means there has been little impact on E&P company share prices, as investors haven’t yet given greater value to those companies successfully embracing the new mantra. Although no true E&P companies are included in the Standard &

Poor's 500 stock index, the weighting of the energy sector (capitalization weighted) has reached a historical low and appears stuck at that level even after some share price recovery and in spite of higher oil prices. The weighting for 1Q 2019 was 5.3%, up from 5.3% in 4Q 2018.

Exhibit 4. Stocks And Oil Prices Not In Sync Now

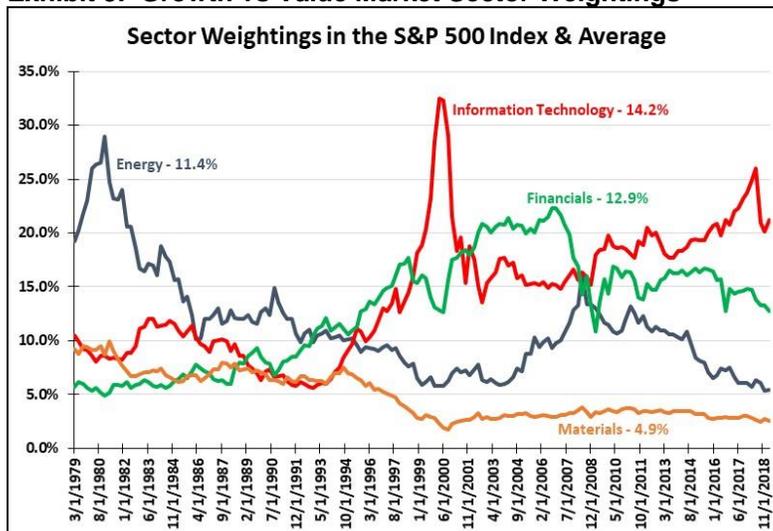


Source: EIA, S&P, PPHB

The last time the energy sector weighting was nearly this low was in the early 2000s, as technology and dot.com stocks were peaking

The last time the energy sector weighting was nearly this low was in the early 2000s, as technology and dot.com stocks were peaking. The rapid rise in oil prices from then to the 2008 financial crisis and recession lifted energy stocks and the sector's weighting in the S&P 500. Since then, however, despite higher prices since the 2014 oil price drop, energy shares have underperformed. This extended underperformance, coupled with changes in the outlook for energy given the increased focus on climate change and the public's growing clamor to limit and eventually eliminate fossil fuels, has now generated the capital discipline focus of investors. The Cowen analysts wrote about E&P shares and FCF:

“The move to focus on returns to shareholders, FCF generation and restrained growth began back in mid-2018 and since then, E&P shares have lagged the broader market by 14% and have lagged the 34% move in crude pricing off December's lows by 22%. At the same time, balance sheets are generally minimally levered and valuation multiples have compressed dramatically towards 4.5x from 8x+ a few years ago.”

Exhibit 5. Growth vs Value Market Sector Weightings

Source: S&P, PPHB

Value stocks, or those with the highest book-to-market ratios, trailed growth stocks over the past decade

To better understand how energy shares have underperformed more growth-oriented sectors, resulting in energy's weighting in the S&P 500 to fall to current lows, we plotted energy and materials against information technology and financials. The underperformance of value stocks compared to growth ones was recently highlighted in a "Heard On The Street" column in *The Wall Street Journal*.

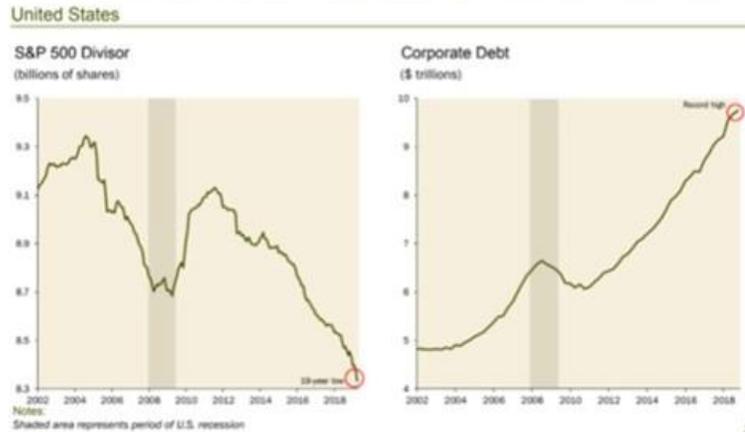
According to research by University of Chicago finance professor Lubos Pastor, value stocks, or those with the highest book-to-market ratios, trailed growth stocks over the past decade. He further stated that the only other time in recent years that occurred was in the late 1990s. This pattern is certainly reflected in the trend in the S&P 500 weighting for energy shares, and materials stocks, also.

By embracing capital discipline, which leads to generating FCF and returning a larger proportion of that cash to shareholders, energy executives are hoping their shares will become more popular with investors and increase in value. Another demonstration of energy executives' commitment to improving their financial profiles and becoming more shareholder-friendly is share buybacks as the way to return cash to shareholders. A series of charts may help put into perspective not only what has happened recently within the energy sector, but also within the overall stock market.

Part of the market's rise has been fed by corporations borrowing at low interest rates and using the funds to repurchase shares

One aspect of continuing our experimentation with historically low interest rates has been the improvement in the U.S. economy and corporate profits, which are responsible for driving the stock market to all-time highs. Part of the market's rise has been fed by corporations borrowing at low interest rates and using the funds to repurchase shares. That phenomenon is shown by the continued decline in the S&P 500 Divisor, which reflects shares outstanding of the companies in the index, and the rise in corporate debt.

Exhibit 6. Impact Of Historically Low Interest Rates
MOST PRONOUNCED DEBT-EQUITY SWAP OF ALL TIME

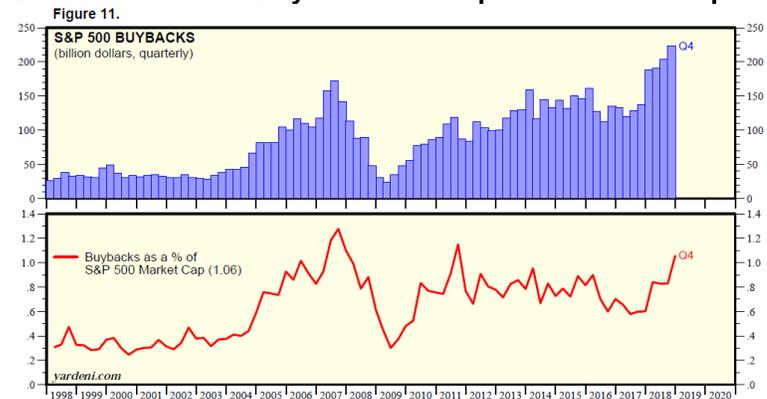


Source: Hoisington

Share repurchases are much higher than during the final years of the 1990s and early years of the 2000s

To demonstrate the greater volume of S&P 500 shares being repurchased, we show the quarterly repurchases along with their share of the index’s market capitalization. Since the 2008-2009 financial crisis and recession, share repurchases are much higher than during the final years of the 1990s and early years of the 2000s.

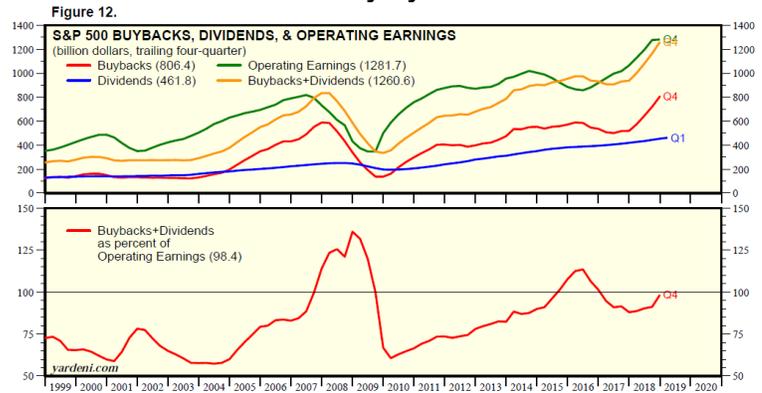
Exhibit 7. S&P 500 Buybacks And Impact On Market Cap



Source: Yardeni Research

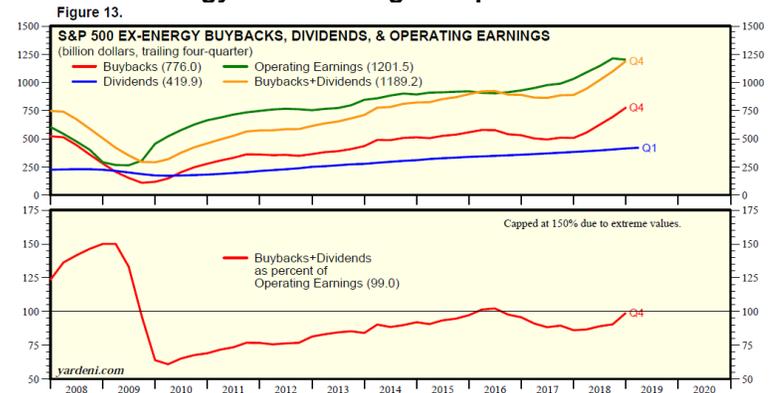
The S&P 500 share repurchase chart doesn’t single out the impact of energy company activity. Two charts showing buybacks, dividends and operating earnings for the S&P 500 index, and for index without consideration of energy companies, truly highlights what has been happening with energy and its impact on the overall index.

Exhibit 8. S&P 500 Index Key Dynamics



Source: Yardeni Research

Exhibit 9. Energy Had Meaningful Impact on S&P

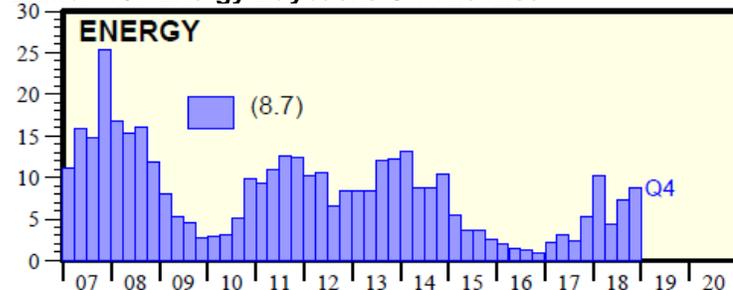


Source: Yardeni Research

Energy companies had a disproportionate impact on the overall index during the years of the financial crisis and after the 2014 oil price collapse

The charts show that energy companies had a disproportionate impact on the overall index during the years of the financial crisis and after the 2014 oil price collapse. That impact can be observed by noting the lower volatility of all the categories of buybacks, dividends, operating earnings and buybacks plus dividends, as well as the percentage of operating earnings.

Exhibit 10. Energy Buybacks On The Rise

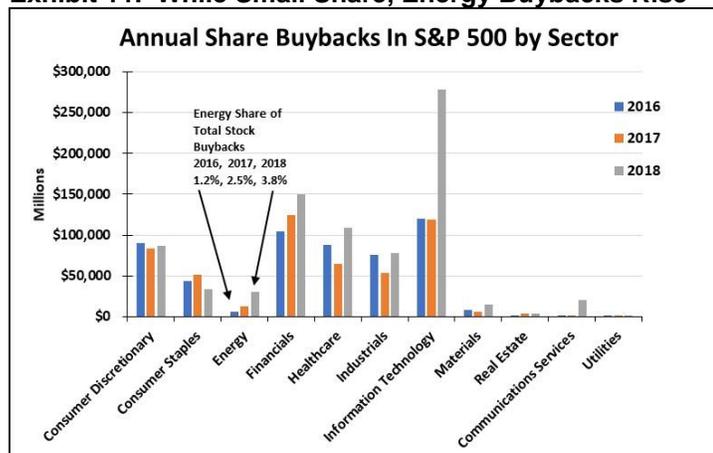


Source: Yardeni Research

Since the fourth quarter of 2016, energy company share repurchases have been rising

The chart showing the dollar value of quarterly share buybacks by energy companies within the S&P 500 index suggests that since 2007, the trend has been downward. However, what is evident is that share repurchases were fairly steady throughout most of the energy boom era of 2011-2014 when oil prices surpassed \$100 per barrel. Share repurchases fell substantially following the 2014 oil price decline. Even large international oil companies ceased repurchasing their shares due to the financial pain caused by the sharp fall in oil prices in 2014-2015. Since the fourth quarter of 2016, energy company share repurchases have been rising. We do not have 1Q 2019 data yet, since not all energy companies have reported their financial results including their share repurchases. We do know that overall corporate share repurchases to date are \$180 billion, down from the record \$223 billion purchased in 4Q 2018, but projections are for total spending to exceed \$200 billion in the quarter.

Exhibit 11. While Small Share, Energy Buybacks Rise



Source: S&P, PPHB

However, as a percentage of the S&P 500 shares repurchased, energy witnessed a sharp increase – doubling from 1.2% in 2016 to 2.5% in 2017, and then increasing by 50% in 2018 to 3.8%

We plotted the sector repurchases annually for 2016-2018, which shows energy as a small component of total S&P 500 repurchases. However, as a percentage of the S&P 500 shares repurchased, energy witnessed a sharp increase – doubling from 1.2% in 2016 to 2.5% in 2017, and then increasing by 50% in 2018 to 3.8%. That trend certainly suggests energy companies have become sensitive to the need for capital discipline and returning more cash to shareholders from the FCF generated by better oil prices. While it has yet to help energy shares prices meaningfully, the industry is now swimming in different waters than only a few years ago. This is one more example of the need to be sensitive to how waters may change and business strategies need to adjust.

Electric Vehicles, Transportation And The Oil Market

People involved in one segment of the oil market - transportation - are already swimming in water that might change quickly

To understand the outlook for oil, one must monitor developments in the transportation sector. As David Foster Wallace, in his joke [This Is Water](#) reminded us, we need to understand the water we are swimming in and how it might suddenly change if we want to be prepared for the future. People involved in one segment of the oil market - transportation - are already swimming in water that might change quickly, especially when one examines forecasts about the future of personal transportation.

This market segment has increasingly been assaulted in recent years by the climate change movement. It demands that we transition not only to more energy-efficient motors, but actually to embrace ones that do not emit carbon emissions from their tailpipes. Of course, these new vehicles must be safe. The ideal solution is electric vehicles (EV) because they don't burn any fossil fuels and they can provide the platform of new transportation businesses that rely on technology that is superior to human drivers. With the ideal vehicle identified, the objective of the climate change movement became convincing politicians to regulate the traditional internal combustion engines (ICE) out of existence.

Ride-hailing services, which would eventually be based on EVs and autonomously-driven vehicles, were seen as the solution to urban congestion and increased safety

A visionary aspect of the EV movement was to reinvent the personal transportation model. Ride-hailing services, which would eventually be based on EVs and autonomously-driven vehicles, were seen as the solution to urban congestion and increased safety. Autonomous vehicles, including those operating as part of ride-hailing services, would be programmed to never have accidents, while also being able to crowd more vehicles into smaller spaces. This vision leads to few people owning cars, so there would be no need for parking garages, freeing up urban space for more homes and/or green spaces.

The most successful markets have been those fostered either by high subsidies or dictates

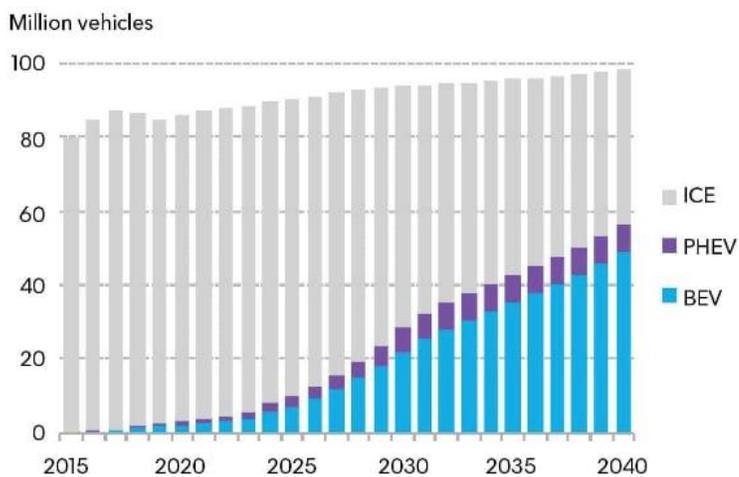
EVs initially started as high-priced status symbols. With the growth of clean energy mandates and tax subsidies, the high cost of EVs was moderated to induce more buyers. The mandates, and now plans to ban the sale and use of ICE vehicles, has pushed conventional automobile manufacturers to begin building and selling EVs – primarily for self-defense. Without EV models, car companies would not be able to satisfy a growing segment of new car buyers. With some mandates, car companies would only be able to sell ICE vehicles if they sold a certain percentage of EVs in their total fleet sales. Although the pace of U.S. EV market growth has not been spectacular, the most successful markets have been those fostered either by high subsidies or dictates. The world's largest EV market is China, where governmental control of the economy, coupled with urban pressures and air quality issues, has promoted EV sales. These stimuli have gotten the EV market underway and are now accelerating its growth.

One reason why the forecast has been aggressive is largely because BNEF has a heavy presence in China, often referred to as the epicenter of EV adoption for both cars and buses

One of the most aggressive promoters of EVs has been consultants Bloomberg New Energy Finance (BNEF). The firm has recently released its latest forecast for the EV market. One reason why the forecast has been aggressive is largely because BNEF has a heavy presence in China, often referred to as the epicenter of EV adoption for both cars and buses. Underlying their forecast is the belief that the price of EVs will soon be competitive with conventional ICE cars. With this foundation, BNEF believes that the growth of ICE passenger vehicles may be peaking. If true, it changes the nature of the new car market for automobile manufacturers.

Exhibit 12. EV Sales To Grow Even Faster

Global long-term passenger vehicle sales by drivetrain



Source: BloombergNEF

Source: BNEF

He believes the rate of EV adoption will be much faster than forecast, so much so that he predicts the 2040 target could be reached in 2030

One consultant we follow has championed the EV and its ability to restructure both the automobile industry and its chief supplier, the oil industry. He suggests that BNEF’s 57% EV market share in 2040 is too low. He believes the rate of EV adoption will be much faster than forecast, so much so that he predicts the 2040 target could be reached in 2030. He also believes that BNEF has been much too generous in how large the total automobile market will be, given the rapid acceptance of ride-hailing services, car-sharing and autonomous vehicles, as personal car ownership declines. BNEF is forecasting that total new vehicle sales in 2040 will be nearly 100 million units. If that estimate is too high, the market share of EVs will grow much faster than suggested in the BNEF forecast. That could force auto manufacturers to abandon building ICE vehicles much sooner than predicted.

Issues for that scenario involve economics and technology. Much about the economics of ride-hailing services have become known from the initial public offering prospectuses of Lyft, Inc. (LYFT-

The idea that technology can match cars with riders is based on the belief that car-hire can be turned into a critical urban transport infrastructure

Nasdaq) and Uber Technologies, Inc. (UBER-NYSE). Both companies are losing billions of dollars in their basic businesses of providing taxi services via smart phone apps. The idea that technology can match cars with riders is based on the belief that car-hire can be turned into a critical urban transport infrastructure. This may convince millions of people to abandon owning their own cars, which mostly sit idle, and allow vehicles and roads to be used more efficiently, while also reducing pollution.

The lowest breakeven fare that an operator of an autonomous taxi could expect to charge is \$1.31 per mile

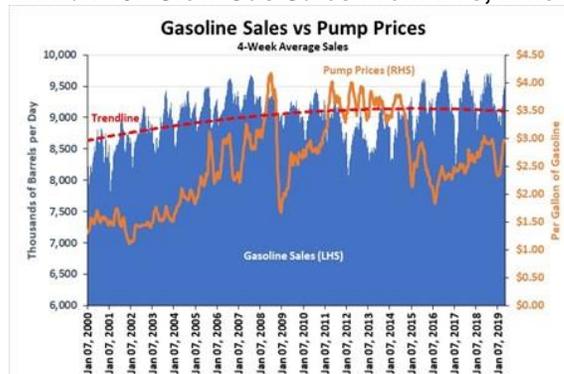
So far, the increased scale of these ride-hailing services has yet to turn losses into profits. The ride-hailing companies must make more money per trip by either charging more or cutting the cost of drivers. This is the ultimate objective of autonomous vehicles, which eliminate humans from the transportation equation.

A new study in Science Advances shows that between 2010 and 2016, time lost to congestion in San Francisco rose by 62% more than it would have in the absence of ride-hailing vehicles on the streets

A recent study by MIT concludes that driving your own car, including ownership costs and expenses such as fuel and parking charges, costs \$0.72 per mile. The lowest breakeven fare that an operator of an autonomous taxi could expect to charge is \$1.31 per mile. This cost is a result of the ongoing expenses of operating the vehicle when it is empty, besides the need for some human oversight by safety monitors whose cost must be covered by the fare revenues. This cost spread is significant, and will not be closed easily or quickly.

One downside of autonomous vehicles and ride-hailing services is congestion. The cheap fares have been shown to reduce the number of people using mass transit as well as even walking to destinations. A new study in *Science Advances* shows that between 2010 and 2016, time lost to congestion in San Francisco rose by 62% more than it would have in the absence of ride-hailing vehicles on the streets. Improving the response time and lower the cost of operating ride-hailing services is dependent on eliminating congestion. This is why the leading ride-hailing services are pushing cities such as New York to initiate congestion pricing in the mid-town region.

Exhibit 13. Slow Gas Sales From EVs, Efficiency and Prices

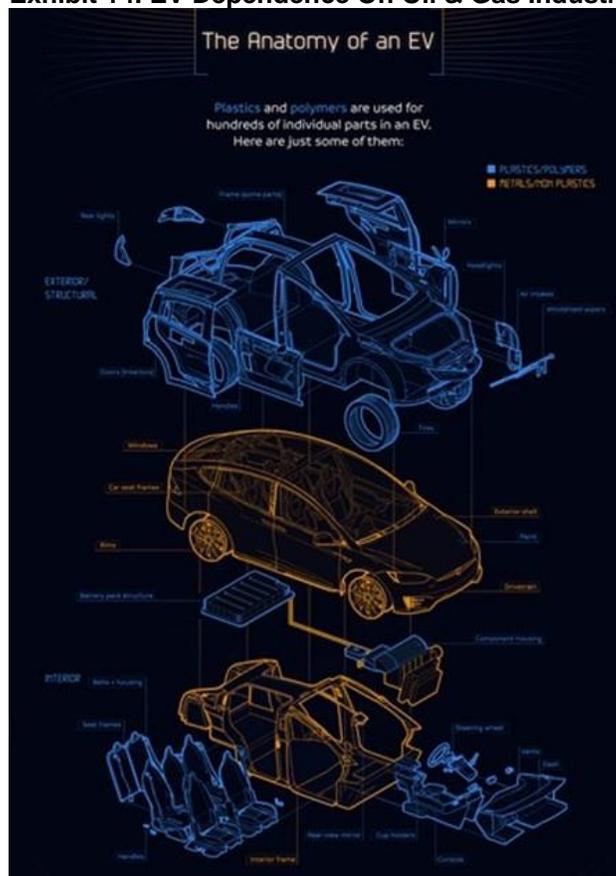


Source: EIA, PPHB

The improved vehicle fuel-efficiency, coupled with the early penetration of EVs into the U.S. vehicle fleet, has slowed the growth in gasoline consumption

The goal of the EV movement, and those sponsoring ride-hailing services and autonomous vehicles, is to eliminate gasoline burning vehicles and their carbon emissions. The improved vehicle fuel-efficiency, coupled with the early penetration of EVs into the U.S. vehicle fleet, has slowed the growth in gasoline consumption. Some of the slowdown may also be due to higher gasoline pump prices.

Exhibit 14. EV Dependence On Oil & Gas Industry



Source: *Visual Capitalist*

Without plastics and polymer compounds (in blue), it would be almost impossible to build an EV

Even if EVs become a significant segment of the total vehicle fleet, there will still be a need for gasoline and diesel fuel, as well as oil and natural gas for plastics and polymer fibers to build cars. We were once asked by an engineer in the audience during our presentation about the cost of automobiles if all oil and gas was eliminated, thereby eliminating plastics. As the *Visual Capitalist* presented, via a schematic of an EV, without plastics and polymer compounds (in blue), it would be almost impossible to build an EV. Moreover, due to the heavy weight of the battery, which needs to be larger to gain greater traveling range on a single battery charge, the performance of the EV would be atrocious, sufficient to drive buyers away. Most battery packs weigh over 1,000 pounds, making EVs

Climate change promoters and sympathetic politicians are working to radically change the water, and quickly

heavy. A Tesla Model X weighs 5,381 pounds, while a Toyota 4Runner weighs 4,259 pounds, more than an 1,100-pound difference.

The auto and oil company executives swimming to today's waters are thinking that changes to their businesses will happen at a moderate pace. They need to be aware that climate change promoters and sympathetic politicians are working to radically change the water, and quickly. Understanding the conditions of the water you are swimming in is critical for managers to be successful.

The Challenge Of Getting To Rhode Island

This year's plan: attend the meeting; head home afterwards; finish packing the car; and depart for Rhode Island

Our annual trip to our summer home in Rhode Island is always an adventure, but events and conditions this year made it feel like the longest and slowest trip in years. Even days after arriving, we are still struggling to understand why we felt this way. Was it a problem with our normal routine at this time of year, or merely that we routinely underestimated the amount of time everything required? What we did experience provided was surprising relative to expectations based on recent drives.

Our usual routine is to depart on a Friday in early May following our attendance at the Trican Well Service Ltd. (TCW-TO) first quarter board meeting and annual general meeting. Every so often, that Friday departure coincides with the monthly meeting of the Houston chapter of the National Association of Corporate Directors (NACD). When those events combine, we race from the AGM to the Calgary airport to catch the last flight to Houston. The flight means a short night, as the NACD meeting starts at 7 am. This year's plan: attend the meeting; head home afterwards; finish packing the car; and depart for Rhode Island.

The plan was working like clockwork, as we passed through customs and immigration at the Calgary Airport about 45 minutes before boarding time. Unfortunately, the inbound flight was expected to be 30 minutes late. We could handle the delay. It turned out to be 45 minutes late. With a 3 ½ hour flight, there was certainly time to make up some of the delay.

We were heading for DFW Airport to refuel, wait out the storm, and then return to Houston

It was a delightful flight for over three hours, but then the pilot announced that Houston Intercontinental Airport was closed due to the violent storms moving through the area. Since there was no estimated time for its reopening, we were heading for DFW Airport to refuel, wait out the storm, and then return to Houston.

As we landed at DFW, we were an hour behind schedule. The plane drove around the airport looking for a gate before heading to a remote parking area. Many flights had been diverted to DFW, along with some sent to Austin and San Antonio. Once we were parked, Air Canada's plans changed, forcing passengers to make decisions

We were told that we could disembark and either find our own way to Houston or wait for an Air Canada-arranged flight at 7 am

about the remainder of their travel plans. The pilot announced that rather than wait, headquarters was ordering the plane back to Calgary, to the outrage of the passengers!

We questioned why the airline wasn't arranging a bus to transport passengers to Houston – there were only 58 of us. The cabin staff questioned each passenger about whether they wanted to return to Calgary or leave the plane in Dallas – only five passengers wanted to return. After telling us that Air Canada was working on ground transportation, we were then told it was impossible. Instead, we were told that we could disembark and either find our own way to Houston or wait for an Air Canada-arranged flight at 7 am.

This time it was a nearly 45-minute hold to connect with a reservation agent

Those going on their own were bused to the terminal. The idea of renting a car and driving in the rain all night was not appealing. We elected to be rebooked onto the next morning's flight. The next news update was that the 7 am flight would be delayed until 10:30 am, to the groans of the remaining passengers. That announcement was soon followed with two announcements: we were to disembark for the terminal, and we were to call an 800-number and arrange our rebooking. We were assured Air Canada's reservation people were prepared and expecting our calls.

Would you be surprised to learn that the Air Canada reservation person we connected with after a 20-minute hold knew nothing about our situation, or what flight we were talking about? The gentleman went to work, enlisting second level support. He first had to find out what was going on and our options, since Air Canada doesn't fly between Dallas and Houston. He found a United flight, but the Air Canada computer system had all passengers "locked" as we were "still on the diverted flight." At this point, we lost our connection, and had to start the rebooking process all over again. This time it was a nearly 45-minute hold to connect with a reservation agent. We were fortunate, this lady was totally knowledgeable about the situation. The big problem was that we were at the end of the line, as Air Canada's operations were working on arranging a plane from Dallas to Houston, but first they had to deal with the passengers on the Montreal to Houston flight.

The reservation agent assured us that all the diverted passengers were guaranteed seats on the dedicated flight at 10:30 am

The reservation agent assured us that all the diverted passengers were guaranteed seats on the dedicated flight at 10:30 am. What we didn't know was from which gate we would be departing. At 2 am, we prepared to find a spot to catch some sleep, as we couldn't leave the airport, as we had no boarding pass to get back in.

While on hold to speak with the second reservation agent, we were approached by two young men traveling on the flight who asked if we knew anything, as they had not been able to connect with Air Canada reservations. After telling them we were on hold, they wandered off. After speaking with the reservation agent, we saw the men and waved them over. We passed our phone to them. While

They weren't able to complete their rebooking arrangements until 4 am, at which point they returned our phone

they were talking with the agent, three Asian ladies from the flight walked up, telling us that they were trying to figure out how to get back to Vancouver and skip Houston, which was only a weekend trip for them. We told them to wait for the men to finish and then they could talk to the reservation agent.

The details of the ladies' travel arrangements required extensive hold periods. As a result, they weren't able to complete their rebooking arrangements until 4 am, at which point they returned our phone. At that point, we checked the Air Canada web site hoping for updated information. Not good news. Our flight was delayed from 10:30 am to 1 pm. We immediately called the Air Canada reservations, and were put on hold for 30 minutes, only to find out that the agent knew nothing about the flight, as operations was still working out details. We were told the flight would likely leave from the Air Canada gate, which was in the next terminal. We made our way to Terminal E, where we found not only the Air Canada gate, but United gates and the United Club, of which we are a lifetime member. We went in and settled down to wait.

All of a sudden, the Club staff lady said, "You must be the luckiest person," as she pulled a boarding pass from the printer

After a while, we checked with the United Club staff about when the Air Canada gate agents were likely to show up. Air Canada uses contract labor, we were told, so they won't know much more than the web site. We asked the chances were of getting on a United flight to Houston. After checking – the only flight we could be confirmed on was at 6:55 pm. We asked about the 9:50 am flight, but the United app showed the flight with 12 people on standby. We then got an alert from United about that flight, but the Club staff couldn't find us listed as a passenger. All of a sudden, the Club staff lady said, "You must be the luckiest person," as she pulled a boarding pass from the printer. It appears the first Air Canada reservation agent had actually gotten us on that flight. No one can explain why our name didn't appear on the passenger manifest initially.

We didn't intend to go into so much detail about our travails, but it may explain why our Rhode Island trip felt liked it did. After landing, we raced home to finish packing. We needed to make a stop at Costco to have our hearing aids checked out since they started acting up on the way home from Calgary. Fortunately, it was a quick stop. They replaced the receiver of one of the hearing aids and sent us off after 10 minutes. We grabbed a foot-long hot dog lunch there (highly recommend) and took off. Fortunately, the rain held off for most of the drive until dinner-time in Slidell, Louisiana.

As we entered Mississippi at 8:45 pm, we noticed the rest stops on both sides of the highway were full with trucks parked for the night

The traffic wasn't heavy, which surprised us given it being a Friday afternoon. We only experienced two traffic delays – at the bridge over Lake Charles and again as we crossed the Mississippi River at Baton Rouge. The truck traffic wasn't unusual, and the traffic flowed well. As we entered Mississippi at 8:45 pm, we noticed the rest stops on both sides of the highway were full with trucks parked for the night. There was almost no truck traffic during the evening drive.

It was obvious that the hotel didn't have any electric vehicle charging stations

We were in the rain, although it was not heavy. Arriving at the Hampton Inn at Hattiesburg, we found we had gotten one of the last rooms as graduation had the hotel full. We also encountered an electric car parked under the porta-cochere and plugged in to an outlet on the hotel's wall. It was obvious that the hotel didn't have any electric vehicle charging stations. Having gotten little sleep the prior night, we were certainly ready for the bed.

Given the nice weather, we enjoyed the wildflowers blooming along the highways and in their medians

Saturday morning came quickly, heralded with claps of thunder and deluges of rain. By the time we were ready to depart, the rain had stopped. The sky was very dark, but transitioned to layers of gray clouds before patches of blue sky. Skies became bluer before becoming cloudy. All morning we saw groups of hawks circling on reconnaissance flights over the highway looking for morning feasts. Those successful in finding road-kill were chased away whenever a car approached. Given the nice weather, we enjoyed the wildflowers blooming along the highways and in their medians. Fortunately, we experienced only occasional sprinkles of rain throughout the day, even though weather radar had storm clouds chasing us. They caught us as daylight disappeared, making the driving much tougher.

Earlier in the day, we noticed the electronic truck parking signs in Tennessee were inactive and the truck parking lots barely half full. Is there a direct connection between these two? What we experienced was many more trucks on the Tennessee and Virginia highways than we expected, or had experienced the previous day. Moreover, given the rain, we were constantly fighting the clouds of water sprayed by the trucks' wheels, which made driving especially challenging whenever we came upon a truck convoy. All these trucks – and it was a Saturday night!

In Pennsylvania, we were stopped by a closed left lane, forcing a 3-4-mile backup as three lanes squeezed into two

Sunday dawned as a disaster. It was pouring rain, making even getting to our car in the hotel parking lot a challenge. With only about 450 miles to go, we settled in for a long, challenging drive. We estimated arrival in the 3-4 pm window. In Pennsylvania, we were stopped by a closed left lane, forcing a 3-4-mile backup as three lanes squeezed into two. When we got close to the cause of the closure, it became apparent the shutdown allowed the parking of a fleet of emergency and clean-up vehicles for a multi-truck accident in the median. Stuff was all over the area. We couldn't tell what it was, but a trash container was being loaded by front-loader tractors. There were multiple heavy-duty tow trucks, an ambulance, Pennsylvania highway trucks, signs and police. That cost us 45 minutes of delay.

As the rain intensified and the traffic built, our car's GPS rerouted us away from I-287 to I-80, meaning we were heading to the George Washington Bridge, the Cross Bronx Expressway and onto I-95. At first it seemed like the right move, but as we approached the GWB the traffic slowed and remained that way through Exit 13 in

Putting on your blinders and fighting for your space is the only way to survive

Connecticut. The fun of driving that route is getting into the mindset of New York and New Jersey drivers who aggressively compete for any open space seeking an advantage. Putting on your blinders and fighting for your space is the only way to survive.

This trip seemed soooo slow, yet we have no idea why

We finally got to the service plaza in Darien, Connecticut (our hometown) and stopped for a quick break. It was now after 3 pm. The plaza was packed, which may have been due to increased traffic since it was Mother's Day. The remainder of the drive proved uneventful, merely navigating a traffic-loaded highway. We were happy we were not heading south as the backups on that side were frequent and long. We arrived at our Rhode Island house around 5:30 pm. This trip seemed soooo slow, yet we have no idea why. Recently our trips have been a breeze. Guess we were due for a tougher one.

The only heavy truck traffic we experienced was in the Northeast – so maybe the economy isn't as robust as suggested by economic statistics

Final trip impressions: the only heavy truck traffic we experienced was in the Northeast – so maybe the economy isn't as robust as suggested by economic statistics; there were hardly any police along the route, other than at construction sites and accidents; gasoline prices were little different from Texas, until we reached the Northeast, which reflects much higher state taxes; restaurants were not packed, although one became so after people attending local graduation ceremonies arrived; hotels were packed, as we stopped near universities and colleges; and new infrastructure projects are underway – mostly from Alabama to Connecticut, which hopefully will be completed by our return drive this fall.

Most of the infrastructure projects involved rebuilding highway bridges, although the entire interstate is being rebuilt in downtown Birmingham, Alabama

Most of the infrastructure projects involved rebuilding highway bridges, although the entire interstate is being rebuilt in downtown Birmingham, Alabama. In Connecticut, we saw bridge replacement sections being readied for a quick rebuilding of a Boston Post Road bridge over I-95. This technique has been used in Rhode Island to enable the demolition and replacement of a highway bridge in one week! We subsequently learned that the bridge rebuild will shut down the Interstate for two consecutive weekends starting next Friday.

Sorting Out The Confusing Forces Shaping Oil Prices

Three of the four countries are in the news almost daily for their economic and geopolitical travails, as well as their oil production and export woes

AltaCorp Capital Inc.'s energy research published a chart of projected oil supply from four of the troubled producers in the world. The chart comes from oil research consultant Energy Aspects. Three of the four countries are in the news almost daily for their economic and geopolitical travails, as well as their oil production and export woes. Iran, Libya and Venezuela have all been impacted by internal political strife that in two cases was aided by the U.S. imposition of financial sanctions. The sanctions target those nations' oil, which has been the prime source of government income.

One of AMLO's early acts was freezing the opening up of Mexico's oil and gas industry for six months while he reviews lease awards and other contractual agreements Pemex has entered into over the past several years

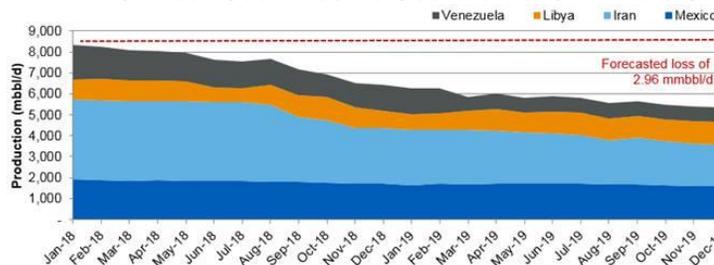
In the case of Libya, the country is engaged in a political struggle between the ruling government and a rebel group hoping to oust the incumbent regime. In contrast, Mexico underwent its revolution last summer with the election of leftist Andrés Manuel López Obrador (known as AMLO) as president who assumed office January 1, 2019. He campaigned on cleaning up the corruption and waste that has dominated the Mexican government and state-owned industries for decades. AMLO's sweeping reform effort targeted the national oil company, Pemex, and its efforts to open up the nation's energy sector. One of AMLO's early acts was freezing the opening up of Mexico's oil and gas industry for six months while he reviews lease awards and other contractual agreements Pemex has entered into over the past several years. Mexico's oil output continues falling and the nation has been beset by gasoline shortages as the government has moved to stop rampant fuel theft. Theft has gone on for years and was estimated by the government to have totaled \$3 billion in 2018.

What the data shows is that from January 2018 to December 2019, these four countries will reduce global oil supply by 2.96 million barrels per day (mmb/d). While the decline began in 2018, mostly due to reduced output from Venezuela, the decline accelerated in spring 2018 when Libya's civil struggle accelerated. The hit to global oil supply increased last summer when the first U.S. sanctions impacted Iran's oil output. Since then, the decline in oil supply has been primarily caused by continued deterioration in Venezuela's and Iran's exports. As the U.S. waivers granted for the purchase of Iranian oil to China, India, Japan, South Korea and Turkey are set to expire at the end of May, expectations are for further declines in Iranian oil exports. From 2.5 mmb/d of exports at the start of 2018, Iranian exports could fall as low as 500,000 barrels per day (b/d) in the second half of 2019. Not all of the countries granted waivers plan to cease purchasing Iranian oil, but it is unknown exactly how much oil they will purchase.

The falling exports from these four countries have contributed to a tightening global oil market, which has driven up oil prices

The falling exports from these four countries have contributed to a tightening global oil market, which has driven up oil prices. As of January 2, 2018, Brent sold for \$66.65 per barrel, which by May 20, 2019, was up to \$73.21 per barrel, a \$6.56/barrel rise, or a 9.8% increase. Just this year, oil prices rebounded by 35.4% from the fourth quarter collapse. As most of the four-country supply decline had occurred by now, and the fate of the waivers can be estimated, it is difficult to know how much more oil prices might rise if supply tightens further. Key to answering that question will likely be the interactions of U.S. oil production growth and global oil demand.

Exhibit 15. Four Countries To Cost Market 3 MMBbls Of Oil



Source: Energy Aspects, AltaCorp Capital Inc.
 Note: Forecasted estimate data begins in March 2019.

Macro Forecaster Outlook (Averaged) - as of May 2019

(mmbbls/d)	Global Supply/Demand Balance									
	Q1/18	Q2/18	Q3/18	Q4/18	2018	Q1/19e	Q2/19e	Q3/19e	Q4/19e	2019e
Demand	98.5	98.8	100.0	100.0	99.3	99.8	100.1	101.4	101.4	100.7
Non-OPEC Supply	61.2	61.9	63.3	64.0	62.6	63.6	64.0	65.1	66.0	64.7
OPEC NGL Supply	5.4	5.4	5.4	5.4	5.4	5.3	5.2	5.2	5.3	5.3
Implied Call on OPEC	32.0	31.5	31.4	30.6	31.4	30.8	30.8	31.2	30.2	30.7
Forecasted OPEC Supply	31.9	31.7	32.0	32.1	31.9	30.5	30.0	30.7	30.7	30.5
Implied (Under) Oversupply	(0.1)	0.1	0.6	1.5	0.5	(0.3)	(0.9)	(0.5)	0.5	(0.3)
Implied Stockbuilts (Draws) (mmbbls)	(9)	14	58	136	198	(25)	(80)	(44)	43	(105)

Source: Energy Aspects, EIA, IEA, OPEC, AltaCorp Capital Inc.

Source: AltaCorp

This projected inventory draw could reverse if demand weakens or supply grows faster than projected, which would hurt oil prices

This unknown demand impact, as well as questionable supply assumptions, is creating a serious challenge for the OPEC+ group

One of the key points of the AltaCorp discussion was the anticipated draws on global oil inventories in the first three quarters of 2019. Some of the draw is attributed to increased refinery runs in anticipation of the need of more low-sulfur fuel oil to meet the upcoming IMO 2020 shipping industry pollution reduction standard. On the other hand, this projected inventory draw could reverse if demand weakens or supply grows faster than projected, which would hurt oil prices. According to Energy Aspects, while global oil stocks declined in 1Q 2019, it reports that since early April through mid-May, there has been a 50-60 million-barrel growth in inventories. OECD countries accounted for 16-17 million barrels of the rise. Unless the next 45 days show a dramatic inventory drawn down, it is impossible to see the 80 million-barrel draw projected in the accompanying table to the oil supply chart coming to pass.

Adding to the challenge in forecasting global oil supply and inventories is understanding underlying demand growth and how much the US-China trade war might hurt that growth. In January, the World Bank cut its 2019 global growth forecast, followed in April by the World Bank, and last week the Organization of Economic Development (OECD). None of the reduced forecasts took into account the current ratcheting up of the trade war. This unknown demand impact, as well as questionable supply assumptions, is creating a serious challenge for the OPEC+ group that has managed a 1.2 mmb/d supply cut that with a nearly 300,000 b/d cut in Canadian output has tightened the market and boosted oil prices.

Two weekends ago, the OPEC+ monitoring group met to assess the market for the balance of 2019 as the members prepare to meet in Vienna on June 25-26 to discuss a possible extension of the current supply cut. While Saudi Arabia and other key OPEC producers

It is likely safe to assume that there will be an OPEC+ production cut maintained for the balance of 2019, even if its size (probably smaller) will not be known until early or mid-July

signaled their intention to keep output curbs in place through the second half of 2019, Russia's Energy Minister talked about wanting to wait and see before making a final decision in June. Two possible scenarios were explored: 1) ease the over-compliance with the agreed output cut, which could add 800,000 b/d of supply; or 2) ease the production cuts from 1.2 mmb/d to 0.9 mmb/d, adding 300,000 b/d in supply.

As Russia would like to capitalize on the higher global oil price to assist its economy, there seems to be a willingness to not screw up the market as has happened in the past. Thus, it is likely safe to assume that there will be an OPEC+ production cut maintained for the balance of 2019, even if its size (probably smaller) will not be known until early or mid-July. That resolution will be supportive of the global oil market and oil prices, but there are certainly numerous geopolitical, economic and production/export issues that could dramatically undercut that support. However, any of those supportive events might actually unfold in a way that lifts oil prices, but probably not on a sustained basis unless the event has a long-lasting impact. Steady as she goes is probably the best characterization of near-term oil prices.

An Intriguing Solar Power Device

The system's ability to track the sun all day reportedly increases its productivity by 40%

We recently learned of a solar panel system that isn't fixed to a structure and is reportedly more efficient and certainly more mobile. Smartflower is a set of solar panels that expand into a flower-shape and track the movement of the sun throughout the day, all the while generating electricity for a home or business. (One can go to the Smartflower web site to see the system open and close.) The system's ability to track the sun all day reportedly increases its productivity by 40%.

Exhibit 16. Adding New Feature To Landscape



Source: Smartflower

One of the selling points for Smartflower is that it can be unhooked and moved to another location if the owner moves. That is virtually

These units seem to be incorporated into a building's landscaping

In the morning, as the sun rises, the unit unfolds and begins tracking the sun's movement until sunset when it refolds for the night

impossible to do if one has a rooftop solar panel installation. However, as the sales material points out, you will need a forklift or crane to move and position the unit. You also need a Smartflower technician to program the unit and a licensed electrician to hook up the inverter unit to the home's or business' power source. From the many pictures of installations in North America, these units seem to be incorporated into a building's landscaping, although one needs 17 feet of clearance for the device to operate safely.

In the morning, as the sun rises, the unit unfolds and begins tracking the sun's movement until sunset when it refolds for the night. The panels have brushes attached that sweep debris and dirt off the panels as they unfold and again when they close up. This helps keep them clean and operating efficiently. In winter regions, one may have to clear accumulated snow to allow the unit to unfold and refold. According to the Smartflower FAQ, it works within a temperature range of 104° F and -4° F. The FAQ only says that outside of this range the unit's performance will be impaired, but we wonder whether that means the tracking or panel performance. The units also will shift into horizontal mode whenever the wind reaches 29 miles per hour (mph), and fold up at 39 mph.

Exhibit 17. Smartflower Is Not A Small Unit



Source: Smartflower

Although all the pictures on the company's web site suggest these units are not intrusive, they are not small as the dimensions show. The nine-foot height is augmented when the panels are unfolded. They stretch 16 feet in diameter and are angled to catch the sun's

The cost per kWh shows a clear advantage for the rooftop solar installation

rays so the overall height could be as high as 17 feet. It would appear from the photos that there are no safety restrictions necessary for when the panels are unfolding and refolding.

According to the web site, a Smartflower unit can generate 4,000 to 6,200 kilowatt-hours (kWh) per year, or an average of 11-17 kWh/day. Given that the sun's angle in the sky and intensity changes during the year, this means at the low end, the daily average could range between high single-digit to mid-teens per kWh per day. We cannot verify the data in the exhibit showing a cost comparison between similar-sized Smartflower and traditional rooftop solar systems in North Carolina. The cost per kWh shows a clear advantage for the rooftop solar installation. While the Smartflower show it generates 23% more kWhs over 20 years than the fixed installation, the 81.5% higher installed cost results in a 47.4% higher cost per kWh.

Exhibit 18. Smartflower Loses To Fixed Solar Panels

Cost Comparison of Smartflower vs Traditional Rooftop Solar Installation						
Model	Size	Location	Installation Type	Total kWh production after 20 years	Cost after 30% Federal tax credit	Cost per kWh
Smartflower	2.51	Charlotte, NC	Dual Axis	89,780	\$11,830	\$0.1318
Traditional Rooftop Solar Installation	2.51	Charlotte, NC	Fixed	72,920	\$6,518	\$0.0894

Source: understandsolar.com

Given the economic analysis, we wonder why anyone would purchase such a system. Besides the novelty of having one, these units might make sense if you were wedded to solar and expected to be moving frequently. The web site suggested a Smartflower unit, without specifying its size, costs \$35,000 before the 30% solar tax credit, which is scheduled to decline to 26% in 2020 and 22% in 2021. It is interesting to see the solar devices in the marketplace.

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