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ENERGY INVESTMENT BANKING

MUSINGS FROM THE OIL PATCH

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Allen Brooks
Managing Director

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:

Slow Economic Reopening Means More L-T Energy Changes

The V-shaped recovery is vanishing, with implications for future energy demand. Moreover, questions about long-term social changes due to Covid-19 are raising questions about their impact on future oil use.

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Another Take On The Energy Transition

Another capital-intensive industry facing changing trends that will impact its long-term growth is the global shipping industry. A study of its future offers guidance for how energy markets might be impacted.

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Money Isn't A Four-Letter Word, However Debt Is

Stock buybacks and dividends, driven by cheap money, have lifted stock market performance. Ending them in the current Covid-19 pandemic hurts stock valuations, which investors need in an era of low interest rates.

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Revisiting The Trade Of The Decade

Little did we know that our trade of the decade would actually foreshadow the reality of energy share performance for the last decade. The reasons become obvious when we study ExxonMobil's ROIC results.

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Slow Economic Reopening Means More L-T Energy Changes

How the recovery unfolds will shape both the speed of the recovery and how lifestyles and working patterns are changed in the long-term

Various states and foreign country economies are beginning to reopen as shelter-in-place mandates have helped flatten the curves of coronavirus infections, hospitalizations and deaths. The weeks people were forced to stay at home and unable to work, unless they were employed in essential businesses, have caused significant financial damage. How the recovery unfolds will shape both the speed of the recovery and how lifestyles and working patterns are changed in the long-term. There is plenty of history pointing to cultural shifts following major economic recessions and national traumatic events.

The economy is slowly reopening. Even those governors most opposed to reopening their state's economies due to fear it will lead to another wave of Covid-19 infections are being pressured into starting the process. The early plans involve allowing a limited number of previously-determined non-essential businesses to reopen with severe restrictions. Many of them make businesses unprofitable, something that won't change until restrictions are eased further. For example, there are only vague plans about how quickly restaurants will be allowed to go from 25% of their seating capacity to 75%-100%, levels needed to be financially viable. Additionally, given these capacity limits, establishments won't be rehiring all their former employees because they will unneeded. Many of these workers are receiving income protection via the government Paycheck Protection Program or via additional unemployment payments. The latter protection has created another problem for employers – unemployment payments are often higher than the workers earn when working. The premium income for remaining on unemployment rolls has already disrupted some business plans for reopening. This is one more example of an unintended consequence of government's one-size-fits-all solutions.

Optimism for a V-shaped recovery has largely disappeared

As we consider the next installment of our article from the last *Musings* dealing with how energy markets will be impacted in the near and long term, optimism for a V-shaped recovery has largely disappeared. Possible long-term impacts have yet to be addressed, as people can't see beyond the near-term environment. The extent of most long-term assessments are statements that the future will be different from what we once considered to be "normal."

Near-Term Recovery Considerations:

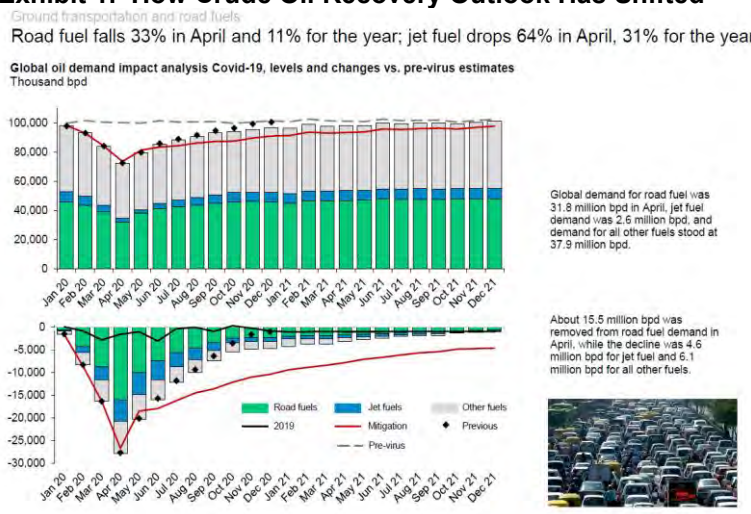
The new oil production agreement in which Russia and OPEC have cut their output sharply has just begun. We are also seeing many U.S. producers, and those elsewhere, are responding to the extremely low oil prices by shutting in wells and ceasing to drill new ones. Despite these supply reductions, it won't help with the volume of crude oil already produced and heading to markets. These large volumes are overwhelming storage capacity, and will continue until

economies reopen and oil demand rises. We saw the effect of the storage tightness in Cushing, Oklahoma that caused the May oil futures contract to fall into negative prices, although the negative pricing was primarily caused by ignorant players in the paper-trading futures market.

Low wellhead prices will continue until demand rebounds, and forecasts for a quick rebound are rare

Low wellhead prices will continue until demand rebounds, and forecasts for a quick rebound are rare. The slow reopening of state economies will limit any significant jump in oil consumption. Energy consultant Rystad Energy recently revised its view of the amount of lost demand and the pace of the market recover. Shifting from a V-shaped to a more moderately-paced recovery has the effect of extending further into the future the return to previously predicted demand levels.

Exhibit 1. How Crude Oil Recovery Outlook Has Shifted



Source: Rystad Energy

A recent Rystad Energy presentation showed a chart of their projection for global oil demand for 2020 and 2021. The top chart in Exhibit 1 shows total oil demand starting in January 2020 at nearly 100 million barrels a day (mmb/d), before falling to 72.3 mmb/d in April. The demand decline is concentrated in road transportation fuel, although percentagewise the jet fuel decline is greater.

That would be consistent with the 19% of investment professionals surveyed last week by CNBC who said the economy would fully recover by year-end

The black diamonds in the months of 2020 represented Rystad Energy's initial recovery forecast that predicted demand would return to its pre-virus forecast of about 100 mmb/d by December 2020. That would be consistent with the 19% of investment professionals surveyed last week by CNBC who said the economy would fully recover by year-end. Surprisingly, another 19% of those surveyed believe the recovery might happen even faster.

The red line shows Rystad Energy's most recent forecast. It is sobering. It shows an initial demand rebound similar to their earlier

That would be consistent with the 33% of those in CNBC's survey who don't see the U.S. economy fully recovering until 2022

forecast, but then the demand recovery pace is much slower. Under this scenario, by the end of 2021 oil demand remains below the firm's original pre-virus forecast. While the slope of the new forecast line appears to increase in November and December 2021, it still means not returning to the original forecast volume until sometime in the first half of 2022. That would be consistent with the 33% of those in CNBC's survey who don't see the U.S. economy fully recovering until 2022. The pace of the U.S. economic recovery is key for world oil markets, as it represents nearly 20% of global oil demand.

If that scenario happens, the oil industry's financial pain, as well as the pain experienced by those who benefit from it will be severe and long-lasting

The Rystad Energy forecast appears as sound as any. The firm has been known to be optimistic when forecasting the future for the oil business, so we anticipate their optimism is reflected in this forecast, meaning their recovery has more of a V-shape to it than other forecasts. We think, given the pace of the reopening of the economy, the oil demand recovery may have more of a U-shape in the early months, just because many populous and energy-intensive states will be slow to reopen. It is our view that the complete recovery of global oil demand is not likely before the end of 2021. If the bottom of the U is extended, and the recovery slope remains consistent with Rystad Energy's projection, then a complete demand recovery might not occur until the second half of 2022. We aren't aware of many forecasts calling for the oil market recovery to take more than two years. If that scenario happens, the oil industry's financial pain, as well as the pain experienced by those who benefit from it will be severe and long-lasting. Include Texas and Houston budgets among those hurt, and residents are likely looking at higher taxes as a result, something that may further slow the recovery.

Are there other data points or historical patterns we can look to for guidance about how the U.S. and global economies might recover? In March, *The Wall Street Journal* published an article about what we may learn about economic activity from previous disasters. Using the National Bureau of Economic Research definition for recessions, the column examined a series of events and their impact on the economy. First was the 1918 Spanish Flu episode, which, despite all its human suffering, resulted in only a -0.5% impact on U.S. economic output. The Asian flu in 1957, which also coincided with an economic recession, saw manufacturing output experience a very sharp and deep V-pattern before soaring. The flu episodes of 1968 and 2009 had little impact on the economy. Likewise, there was no discernible impact on economies from either the SARS and MERS virus outbreaks, nor in Japan from the tsunami and its nuclear power plant disaster. The one episode with a significant and longer-lasting impact was the September 11, 2001, terrorist attack. In that case, the U.S. economy was already slipping into a recession that the fallout from the attack deepened, but which ended just over two months later. What was noticeable about the recovery is that after the sharp rebound, manufacturing activity went sideways and did not return to its pre-recession level until 2004.

It is projecting -7.7% growth this year for the U.S. economy, which is not surprising given a 4.8% decline in 2020's first quarter, with the second quarter potentially contracting by 40%

With the exception of the 1918 Spanish Flu, in which social distancing and quarantining were employed, the limited economic damage probably reflected the low level of manufacturing in the U.S. economy at that time. In one respect, it contrasts with the current economic structure, which is heavily service-oriented. As Mohamed El-Erian, an adviser to German insurer Allianz put it, this was "a sudden stop to the global economy." That is why the International Monetary Fund revised its world economic outlook for 2020 to a contraction of 3% compared to its January forecast for 3.4% growth. It is projecting -7.7% growth this year for the U.S. economy, which is not surprising given a 4.8% decline in 2020's first quarter, with the second quarter potentially contracting by 40%, according to the Congressional Budget Office. The magnitude of such a negative second quarter comes with a forecast for unemployment to reach 14%, levels last experienced during the Great Depression.

Mr. El-Erian said that there are three questions confronting financial markets:

1) When will the economy reopen?
2) How will it reopen – quickly or slowly?
3) How well will central banks bridge the economy across the shutdown's financial challenges?

The political battles over personal freedoms and legal governance are already underway, and they will continue at an elevated level

We are beginning to get some answers to his questions, but the risk of a W-formation for the economy and financial markets exists, as long as there is no final resolution of the health crisis, i.e., a vaccine or herd immunity. Within weeks we will know more about the extent of the damage done to the economy from the mandated shutdowns, as well as the progress being made in battling the coronavirus. Until then, we will be subjected to high levels of speculation about outcomes, as well as forecasts often seeking to be extreme in order for their authors to gain public attention. The political battles over personal freedoms and legal governance are already underway, and they will continue at an elevated level, depending on health and economic data and news, until the economy is completely open.

Long-Term Energy Considerations:

Government entanglement in the capitalistic economy would be much more extensive than it has been up to the outbreak of the coronavirus

As we contemplate the long-term future for the economy and energy, we have been reading, listening and researching the views of people who may have some experience with trends and cycles. One of those people is Mr. El-Erian. In a CNBC interview, he commented on things that would shape the future of the global economy, as well as that of the United States. One is that government entanglement in the capitalistic economy would be much more extensive than it has been up to the outbreak of the coronavirus. A subset of that overarching issue is the question of how we will handle the debt loads that governments will have as they exit the Covid-19 battle. How will this debt be repaid? Will it

ever be repaid, and if not, what potential harm might it bring? One possibility, cited by Mr. El-Erian, is a world with lower productivity, which means slower growth – something that dominated the debate about the economic recovery following the 2008 Financial Crisis.

Other future changes Mr. El-Erian cited were that consumers would become more frugal. Having lost their livelihood due to actions outside of their control, the idea that they were collateral damage has shaken many of them. Statistics show that 60% of people who have lost their jobs are women, and that only 29% of jobs can be done from home, according to the Bureau of Labor Statistics. The Covid-19 shutdowns have been disproportionately impacting service workers, lower income workers and younger workers. This segment of our population is the least prepared financially to weather an extended shutdown, which helps explain the angst and growing anger as the shutdowns have been extended.

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Of great concern for Mr. El-Erian is that we discover zombie companies when the shutdowns end. Possibly of greater concern is that we find zombie markets. If so, we will learn more about structural weaknesses of our economy. Their revelation may point to areas where capital can be directed and become more productive for the overall economy. This may be of high importance given how the overall economy exits the shutdown era. As Dean Turner, economist at UBS Global Wealth Management, pointed out: "All economies will exit this crisis with much higher levels of debt, which will probably lead to a period of financial repression and higher taxation, both on corporations – and perhaps the digital economy in particular – and on personal wealth." He anticipates politicians attacking raising taxes by closing loopholes in tax codes used by multinationals. This may impact company reliance on global supply chains, raising business costs that may only be offset by greater use of automation as a way to help preserve companies' returns on invested capital.

"All economies will exit this crisis with much higher levels of debt, which will probably lead to a period of financial repression and higher taxation, both on corporations – and perhaps the digital economy in particular – and on personal wealth"

As we focus on the dislocations and changes that may occur as a result of the Covid-19 experience and the Russia/Saudi Arabia oil war, it is important to understand the interconnections and knock-ons that come from change, as will happen due to the collapse of oil prices and oil consumption. James Rickard, an American lawyer, economist, and investment banker, wrote about the Japanese Fukushima nuclear disaster and the coronavirus. He wrote:

> "The Fukushima event began with an underwater earthquake in the Pacific Ocean off the coast of Fukushima Prefecture in Japan. The earthquake could have been isolated, but instead it triggered a tidal wave or tsunami.
>
> "The tsunami could have crashed ashore in an uninhabited region, but it didn't. It struck the Fukushima Daiichi Nuclear Power Plant, built on the coast of Fukushima in the town of

Okuma. The power plant then lost its coolant due to the impact of the tsunami and produced three nuclear meltdowns and three hydrogen explosions.

"Finally, the Tokyo Stock Exchange crashed due to the panic selling as a result of the nuclear disaster and other damage to Fukushima.

"The point is that plate tectonics, hydrology, radioactivity and capital markets are individual complex dynamic systems. The earthquake did not have to cause a tsunami. The tsunami did not have to hit a nuclear reactor. The reactor did not have to melt down. And the stock market did not have to crash. But they did.

"Each catastrophe was the direct result of the one before"

"Each catastrophe was the direct result of the one before. Earthquakes, tsunamis, reactors and stock markets all crashed into each other. This is not uncommon because of network effects and interdependencies."

This is a warning as we scope out what may happen to the economy due to demographic, productivity, and capital availability shifts, as well as changes to people's lifestyles, commuting patterns, and how they work. The outcome may prove different than simple logic would suggest. The other thing we know is that the energy industry is a long-cycle business, since its assets are expensive, but have long productive lives, and demand for its products is largely inelastic. Within energy, individual fuels have much shorter cycles because they are impacted by slight imbalances between supply and demand. This creates challenges for managing companies operating within each fuel, given the operational and financial clashes between long-lived, expensive assets that require high utilization rates to justify financing them, and the shorter-cycle boom-bust conditions created by over- or under-supplied markets. Given these business characteristics, we went looking for other industries with similar characteristics for guidance on the future. An industry with very similar characteristics to energy is the global shipping business. A recent paper, as well as earlier research, by one of the deans of shipping research, Martin Stopford of Clarkson Research, has given us some perspective on how long-term energy trends might unfold.

The energy industry is a long-cycle business, since its assets are expensive, but have long productive lives, and demand for its products is largely inelastic

In a recent lecture by Mr. Stopford, he showed a chart tracing the change in global industrial production and seaborne trade. It provides a way of looking at the cycles of the shipping industry. A less up-to-date chart in Exhibit 2 (next page) shows the relationship of GDP, merchandise trade and seaborne trade. The first cyclical bottom occurred in the recession caused by the first oil shock in 1973. This was V-shaped decline and recovery. The second oil shock in 1979 led to another recession and bottom, but it had a more U-shaped dip. The third dip coincided with the 1985 oil price

drop. You also see sharp drops in 1999 following the Asian financial crisis, after the 2001 terrorist attack, and during the economic collapse associated with the financial crisis and recession of 2008-2009. If the chart were updated to 2020, we would see a similar sharp drop associated with the current shutdown due to Covid-19.

Exhibit 2. Shipping And Economic Cycles 1970-2012

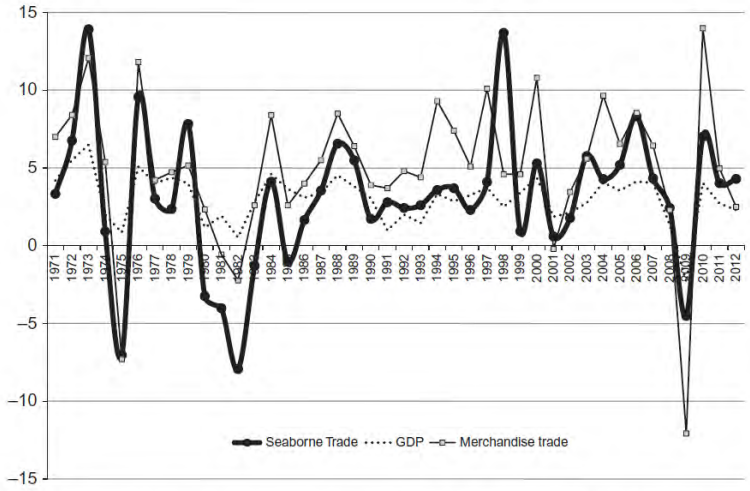


Figure 1. Annual percentage growth in global GDP ($), merchandise trade (volume) and seaborne shipments (tons), 1971–2011.
Source: UNCTAD Review of Maritime Transport 2012 and WTO Trade Statistics, 2012.

Source: "Maritime transport and international seaborne trade" by Vincent F. Valentine, Hassiba Benamara, and Jan Hoffmann, published by *Maritime Policy & Management*, 2013

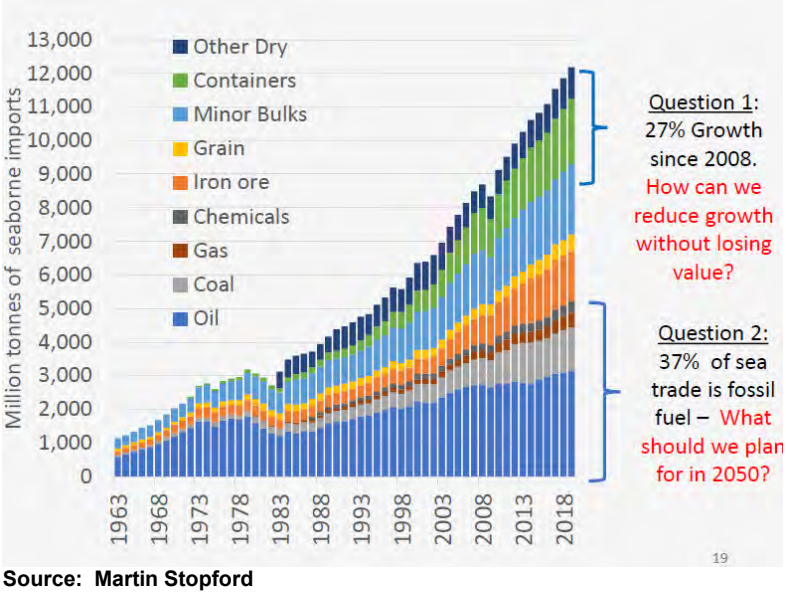
It is instructive to note that virtually all of these cyclical bottoms coincided with sharp movements in oil prices that created recessions.

In recent years, 37% of seaborne trade is from fossil fuels

The reason seaborne trade is so closely related to GDP is the impact of commodity volumes moved in global trade. As shown in Exhibit 3 (next page), in recent years, 37% of seaborne trade is from fossil fuels, a percentage that was substantially higher from the 1960s through the 1980s. Thus, whenever recessions occur or there are disruptions in oil markets, seaborne trade, GDP and merchandise trade were impacted.

Exhibit 3 was prepared to highlight key questions Mr. Stopford was addressing when discussing future trends for the goods and commodities the shipping industry will be carrying in 30 years. As coal consumption declines and oil use is potentially phased out, there will be a significant reduction in shipping volumes, forcing the global shipping industry to adjust. The types of ships that will make up the future fleet will be different, and the global shipping industry may be smaller.

Exhibit 3. How Shipping's Cargoes Have Changed

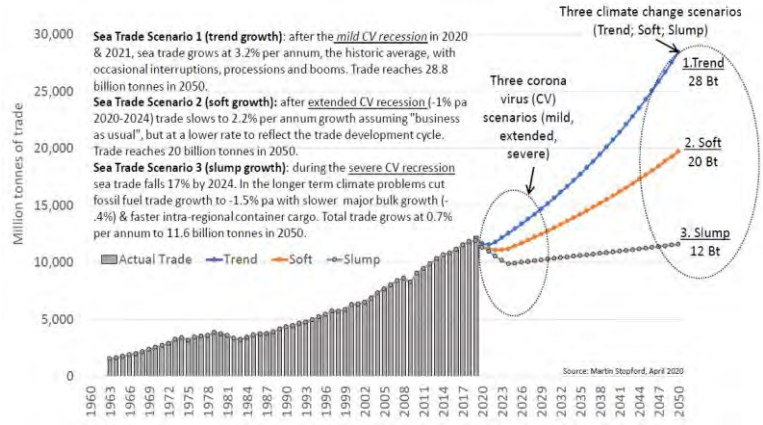


Source: Martin Stopford

Mr. Stopford created three possible scenarios for shipping, which have a bearing on the energy business outlook

When considering these relationships in light of Covid-19, Mr. Stopford created three possible scenarios for shipping, which have a bearing on the energy business outlook. Scenario 1 assumes a mild Covid-19 recession in 2020-2021, which is then followed by seaborne trade resuming its historical growth rate of 3.2% annually. This suggests that the increasing globalization of business continues. It also suggests energy's contribution to global shipping volumes will continue to grow, although possibly not quite as fast as in the past, but there is certainly little sign of a significant decline in energy demand.

Exhibit 4. Scenarios For The Future Of Global Shipping



Source: Martin Stopford

Scenario 2 calls for an extended Covid-19 recession lasting through 2024, followed by a slower seaborne trade growth rate of 2.2% per

As a result of climate change initiatives, fossil fuel trade contracts by 1.5% annually

year in a "business as usual" environment modified by the trade development cycle. Scenario 3 reflects a slump in global growth following a severe recession that lasts to 2024. As a result of climate change initiatives, fossil fuel trade contracts by 1.5% annually, while other bulk trade grows at a much slower than historical rate. The other impact on shipping is faster inter-regional cargo growth, likely reflecting less globalization of business and tighter regional trading relationships.

These three scenarios point to an interesting set of conclusions. Under the "business as usual" scenario, global trade volumes rise from about 13,000 million tons (MMt) of trade in 2019 to 28,000 MMt by 2050. In the soft growth scenario, 2050's trade is 29% lower, rising to only 20,000 MMt. The slump scenario causes global seaborne trade to end up below the volume in 2019.

The experience of the 2008-2009 financial crisis recovery forces us to consider the possibility of a less optimistic recovery scenario this time, too

While these scenarios were fashioned by Mr. Stopford in January, before he knew the magnitude of the Covid-19 impact on economies, and if the virus might be more like the 1918 Spanish Flu that devastated the world. An extended recession may be the outcome of Covid-19, but whether it extends into 2024 is questionable given the magnitude of liquidity and financial support being injected into global economies by central banks. On the other hand, the experience of the 2008-2009 financial crisis recovery forces us to consider the possibility of a less optimistic recovery scenario this time, too, as economic adjustments and lifestyle and working pattern changes reduce consumption. Lower consumption translates into less manufacturing output and less energy consumption. Offsetting some of that reduction will be the reconfiguration of global business supply chains that will require new manufacturing plants and distribution networks.

If we consider the knock-on effects of scenario 3, the shipbuilding industry will be scaled back with significant impact on steel consumption and heavy machinery purchases, but also substantially reduced employment in many countries around the world. That will also lower consumer spending, as many of the jobs eliminated are well-paying positions.

Global shipping currently represents roughly 4% of the world's oil use

If global seaborne trade is lower, and Mr. Stopford's greenhouse gas reduction solutions are embraced by the shipping industry, ships will cruise at slower speeds, further reducing energy consumption. Global shipping currently represents roughly 4% of the world's oil use, so we should be considering some reduction in its contribution to global oil use.

Another industry projected to suffer a much longer fallout from Covid-19 and the financial fallout is air transportation. The fallout from continued pressure for social-distancing measures, and fear of catching Covid-19 and becoming sick away from home, will likely limit the pace of recovery of airline traffic. To compensate for lower

traffic, it is probable that airfares will rise, further eliminating some price-sensitive vacation travel. The best estimates today are that airline traffic will not return to pre-virus levels for 3-4 years, with the emphasis on the longer term. That represents another energy demand component that will contract.

All of these trends will mean less oil used

These demand reductions should be considered as givens, at least for the next several years. How they recover longer term remains to be seen, but as air traffic grows, there may be fewer airlines, leading to less competition on routes, so fewer planes flying and less jet fuel consumed. Altered business supply chains, plus lower consumer spending, may reduce energy used in the manufacturing and distribution sectors. More regional business supply lines will reduce the need for some portion of international business air traffic, the most profitable segment for airlines. That will recycle back into the economics of airlines and lead to higher airfares. Finally, less flying and fewer airlines flying fewer planes, couple with the introduction of new, more fuel-efficient planes and ships mean less fuel consumption. Eventually, as Mr. Stopford lays out, the global shipping industry will reduce its carbon footprint by embracing alternative-fuel-powered ships. Hybrid and fuel cell powered ships are already in trials, besides the shift to liquefied natural gas and bio-diesel fuels. Again, all of these trends will mean less oil used.

The plans to revamp European central city layouts without any automobiles under the guise of recovering from the virus shutdowns will have an impact on energy consumption

The pressure from environmentalists to address climate change in the economic restructuring governments are considering as economies are reopened will increase. The economics of renewables will be challenged, but their ability to offer stable energy pricing will have a powerful psychological impact on consumers, and therefore politicians. The plans to revamp European central city layouts without any automobiles under the guise of recovering from the virus shutdowns will have an impact on energy consumption, especially as U.S. mayors are discussing copying some of the ideas.

Whether Mr. Stopford's scenarios for the global shipping industry come to pass is unknown, but he has provided a realistic range of potential outcomes. The business as usual scenario is highly unlikely given the experiences of the past few months. In addition, the decarbonization pressures on the global shipping industry dictated by the International Maritime Organization's GHG target for 2050 will cut oil use. The IMO target calls for reducing the shipping industry's 2008 GHG emissions by half. The issues raised above, will impact fuel consumption, suggesting a long-term downsizing of the world's oil business. That realization, which is just now beginning to weigh on oil industry executives as they navigate the current industry downturn, will shape company business strategies for the future. Depending on how companies deal with the challenges and opportunities that come from these revised business strategies will determine the winners and losers from the energy industry's restructuring.

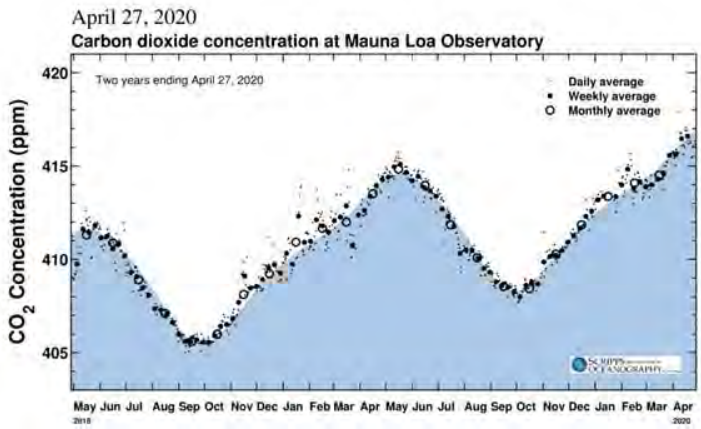
Another Take On The Energy Transition

When cars and trucks don't drive, air planes don't fly and manufacturing business are shut, carbon emissions from the fuels that power those activities will fall drastically

The novel coronavirus has set off a vigorous debate over whether we should prioritize clean energy mandates and investments in the efforts for reopening the world's economies. The pictures of clean air in many cities and regions, as the world's economies shut down, received extensive media coverage. When cars and trucks don't drive, air planes don't fly and manufacturing business are shut, carbon emissions from the fuels that power those activities will fall drastically. Those pictures provided extensive ammunition for environmentalists who want to ban fossil fuel use in their plans to slow the rise in global temperatures and the expected catastrophic impact on the planet's environment.

Proponents of fossil fuels argue that the financial damage done to society's wellbeing by completely shutting down economic activity far outweighs the cost of carbon emissions. They also believe increased energy efficiency, shifting fuel use to favor cleaner fossil fuels, and new energy technologies will enable the world to better mitigate future climate damage from continued fossil fuel use. Besides, they point out, the full cost of overcoming intermittency issues is not reflected in the competitive fuel economic arguments of renewable energy proponents.

Exhibit 5. How CO_2 Has Risen During Shutdown



Source: NOAA

CO_2 concentrations in March and through late April are continuing to rise

Exhibit 5 will probably inflame the debate. It shows the average carbon dioxide concentration in the atmosphere, as measured at the Mauna Loa Observatory in Hawaii. As the chart shows, CO_2 concentrations in March and through late April are continuing to rise. How can that be in light of the massive amount of the world's economy shutdown in the Covid-19 battle? According to a note on the National Oceanic and Atmospheric Administration's (NOAA) web site, where the CO_2 data is located, explained the discrepancy:

"Can we see a change in the CO_2 record because of Covid-19?

"There have been many inquiries whether we can see in our CO_2 measurements at Mauna Loa and elsewhere the slowdown in CO_2 emissions from the burning of fossil fuels. That drop in emissions needs to be large enough to stand out from natural CO_2 variability caused by how plants and soils respond to seasonal and annual variations of temperature, humidity, soil moisture, etc. These natural variations are large, and so far, the 'missing' emissions do not stand out, but we may see them as the year progresses. Here is an example: If emissions are lower by 25%, then we would expect the monthly mean CO_2 for March at Mauna Loa to be lower by about 0.2 ppm. When we look at many years of the difference between February and March, we expect March to be higher by 0.74 ppm, but the year-to-year variability (one standard deviation) of the difference is 0.40 ppm. This year the difference is 0.40 ppm, or 0.33 below average, but last year it was 0.52 ppm below average.

That drop in emissions needs to be large enough to stand out from natural CO_2 variability caused by how plants and soils respond to seasonal and annual variations of temperature, humidity, soil moisture, etc.

"Most of the emissions come from urban areas, so that it may be easier to see the effect downwind of cities, although also in that case they need to stand out from natural variations. Only measurements of carbon-14 in CO_2 would enable us to cleanly separate fossil sources of CO_2 from ecosystem sources and sinks regardless of how variable the latter are."

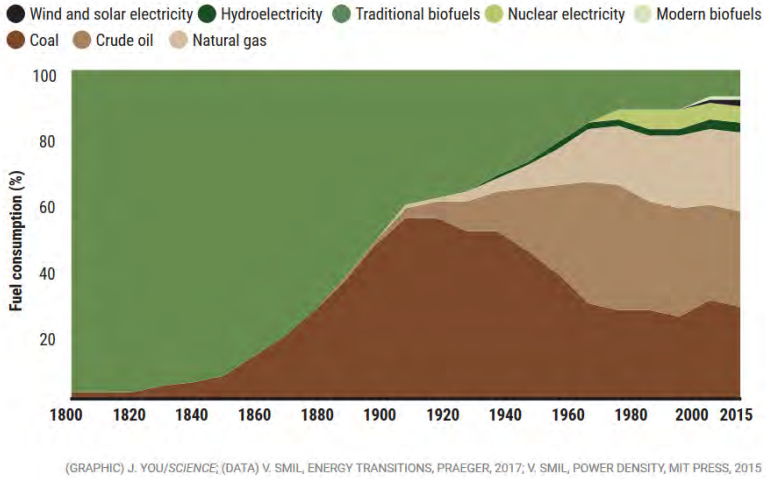
That note points out two critical points in the climate debate that are often overlooked. First, there are natural and seasonal fluctuations in CO_2 emissions that can overwhelm the emissions from burning fossil fuels. Second, we don't seem to have the ability to separate the measurements of emissions from burning fossil fuels from those coming from plants and soil variability.

The reality is we remain solidly in the midst of a global energy transition

Putting all the arguments from both sides of this debate aside, the reality is we remain solidly in the midst of a global energy transition. This phenomenon has been ongoing since man discovered the benefits of fire. People are familiar with charts showing the world's transition from burning wood to a mix of energy fuels – both fossil fuels and renewables. The chart shows how long that transition process has been underway.

Vaclav Smil, the distinguished professor in the Faculty of Environment at the University of Manitoba in Winnipeg, Canada, and the source of the data for Exhibit 6 (next page), has always indicated that energy fuel transitions occur over decades. For example, coal consumption peaked in the early 1900s, some 50 to 80 years after its use began to ramp up, depending on if you say it started in 1820 to 1850. Coal remains a significant global fuel even after more

Exhibit 6. How Energy Has Moved On From Coal Power



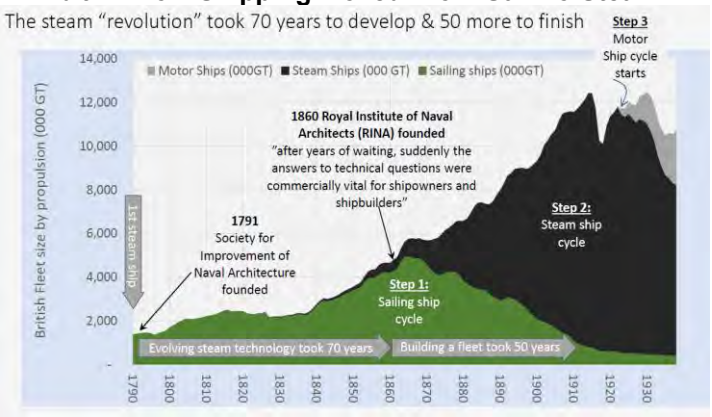
Source: ***Science***

The first tractor appeared in the late 1800s, but the use of horses in U.S. farming didn't peak until 1915

than 100 years of use. Coal has been displaced by other fuels with greater energy density, producing more energy per unit and requiring less land. As Dr. Smil likes to point out, when discussing the realities of transitions, that the first tractor appeared in the late 1800s, but the use of horses in U.S. farming didn't peak until 1915, and continued into the 1960s.

In a presentation, Martin Stopford of Clarkson Research indicated that the transition the global shipping industry is going through, as it deals with both the post-Covid-19 cargo world and the mandate to reduce the industry's greenhouse gas emissions by 50%, is as significant as the industry's transition from sail to steam power. Fuel use and technology combined to force a complete rebuilding of the global shipping fleet. Much like the coal business, Mr. Stopford showed that the transition took 70 years to develop and 50 years to complete. Mr. Stopford shows this transition.

Exhibit 7. How Shipping Moved From Sail To Steam



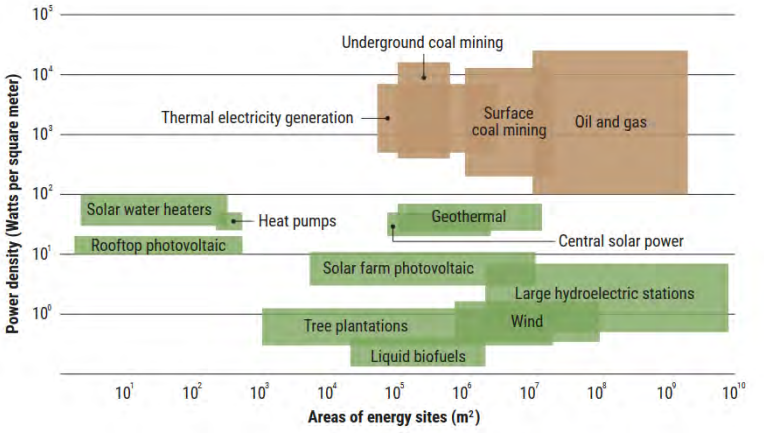
Source: Martin Stopford

We would point out Step 3 in the previous chart, which marks the start of the oil era for shipping, was significantly helped when Winston Churchill, the First Lord of the Admiralty of the U.K., ordered the fuel switch from coal to oil for the Royal Navy. That move also kicked off the significant involvement of the oil industry in the politics of the Middle East.

If we think it might be another 10-20 years before all fossil fuels are in steady decline, and we assume another 50 years to their complete extinguishment, we will be nearing the end of this century when they disappear

While environmentalists would like to see the end of coal, oil and natural gas use, they are so integral to our economy and society, it is impossible to foresee this happening any time soon. If we try to apply the shipping or coal time frames to oil and fossil fuels, one wonders when we would start the developing trend? Should it be when Rachel Carson published Silent Spring in 1962, or the first Earth Day in 1970? That makes it a 50-60-year era. If we think it might be another 10-20 years before all fossil fuels are in steady decline, and we assume another 50 years to their complete extinguishment, we will be nearing the end of the century when they disappear. For this to happen, renewables need to overcome their intermittency and poor energy density rankings. Maybe another fuel will emerge to revolutionize our civilization in the interim.

Exhibit 8. Renewables Suffer From Lack Of Energy Density



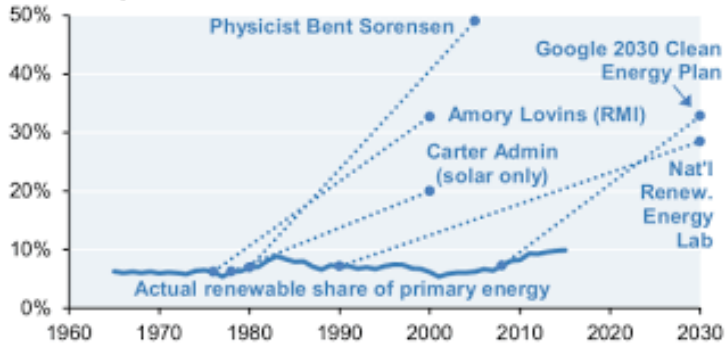
(GRAPHIC) J. YOU/*SCIENCE*; (DATA) V. SMIL, ENERGY TRANSITIONS, PRAEGER, 2017; V. SMIL, POWER DENSITY, MIT PRESS, 2015

Source: ***Science***

Increased use of renewables means countries might have to devote 100 to possibly 1,000 times more land area to energy production

Because of their low energy density rankings, increased use of renewables represents a challenge for countries. Increased use of renewables means countries might have to devote 100 to possibly 1,000 times more land area to energy production. That will have negative impacts on agriculture, biodiversity and environmental quality, assuming they can find such large amounts of open space. Despite lacking solutions for intermittency and low energy density, forecasters are not dissuaded from predicting bright futures for renewables. In virtually every energy forecast, beginning in the mid-1970s, the predictions for renewables have proven to be overly optimistic.

Exhibit 9. Renewables Forecasts Have Been Wrong



Source: ***Wikipedia***

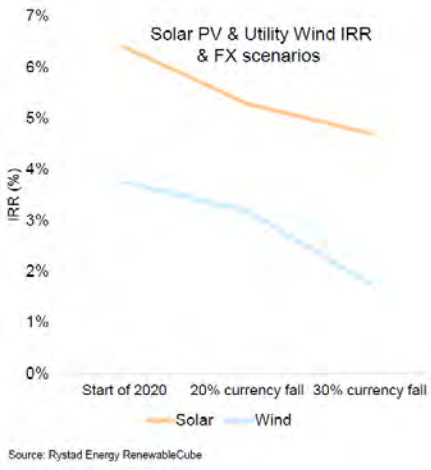
With dispatchable (steady) power sources, there is no need for energy storage

Some of the challenges for past renewables forecasts have been their expense and intermittency. There is nothing that can be done about the latter, despite proclamations that when paired with electricity storage intermittency can be overcome. That merely adds another energy system to the renewable power generating hardware, something that can be done with all forms of electricity generators. With dispatchable (steady) power sources, there is no need for energy storage.

The financial lifeline for renewables, given these limitations, has been political mandates for their use and government subsidies

On the cost side, there has been progress. A significant portion of that cost reduction is tied to the increased manufacturing capacity that has lowered per unit costs. They have also been reduced by increasing the size of units – especially for wind turbines where outputs have increased severalfold over the past decade. There still remains the problem that wind turbines and solar panels still do not last as long, or produce at as high an efficiency rate, as fossil fuel plants. The financial lifeline for renewables, given these limitations, has been political mandates for their use and government subsidies.

Exhibit 10. Renewables Returns Hurt By Currency Changes



Source: Rystad Energy

The significance of the problem is highlighted in the chart (prior page) from Rystad Energy that shows 2020 internal rates of return (IRR) for solar and wind projects and how such project returns are hurt by foreign currency declines versus the U.S. dollar, which is especially important for developing economies.

In order to entice investors into these low-return projects, governments must adopt subsidies and guarantees via long-term power purchase agreements

With IRRs of 6.5% and 4% for solar and wind, respectively, they might fall to 5% and below 2% in a world that suffers a 30% fall in currency value. In order to entice investors into these low-return projects, governments must adopt subsidies and guarantees via long-term power purchase agreements. This return discrepancy issue has been highlighted by energy company CEOs, responsible for allocating their company's capital and who can earn two- to three-times the returns of renewables projects by investing in traditional oil and gas projects. Those executives must convince their shareholders to accept lower returns, and possibly lower dividend payments, for shifting investment in favor of renewables over oil and gas. These reduced returns will also impact a company's share valuations, an important component of shareholder returns, especially important for pensioners depending on retirement funds holding shares in energy companies who would be investing in low-return renewable energy projects.

Consumer attitudes will determine the outcome, much as they have already forced operational changes at oil and gas companies by shunning investing in their shares

The tipping point in this battle will likely revolve around either a radical technological breakthrough that makes renewables much more competitive in energy output and lower in cost. Barring such a development, consumer attitudes will determine the outcome, much as they have already forced operational changes at oil and gas companies by shunning investing in their shares. Will consumers opt for steady energy bills at the expense of lower investment returns from the companies producing their energy? A return to $100 a barrel oil may be the straw that breaks the back of investor and consumer support for traditional oil and gas companies, as they tire of the price volatility. The transition away from oil and gas will take years, but the pace of its abandonment could soon begin to accelerate given the experiences from the economic shutdown.

Money Isn't A Four-Letter Word, However Debt Is

The current economy, debt and oil markets have been upended by the spread of the coronavirus during the past several months

In a recent *Musings*, we wrote about the historical growth of U.S. debt – Federal, corporate and household – and its relationship to low interest rates. The current economy, debt and oil markets have been upended by the spread of the coronavirus during the past several months. The government's tactics in fighting the virus have involved shutting down large swaths of the economy by instituting shelter-in-home orders and mandating the closing of non-essential businesses. To offset the lost jobs and business revenues, the government has created a series of financial aid programs to shovel money to those most impacted. Those programs were approved in the waning days of March and in April. The stimulus checks are being distributed and financial assistance for small businesses and

unemployed workers is flowing, albeit with fits and starts. Help for larger industries such as airlines took longer to negotiate, as the loans and grants have conditions companies hesitated accepting.

"They're now the lender of all resorts"

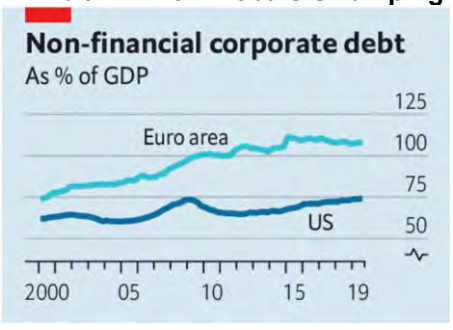
The Federal Reserve has fired two bazooka shots, with the support of the U.S. Treasury, to inject liquidity into financial markets and to provide help for large companies and state and local governments. The most recent shot expanded the list of assets the Fed will purchase. As Peter Boockvar, chief investment officer at Bleakley Advisory Group put it, "Now outside of buying stocks, every asset class is open for the Fed to buy. They're worried about credit. They consider themselves a lender of last resort. They're now the lender of all resorts. Going below investment grade into the high-yield junk area is now a dangerous area they're headed to, but that'll be a discussion for another day."

This second bazooka shot included loans of $1 million to $25 million for midsized businesses. It also is providing term financing to banks involved in the Treasury's Payroll Protection Program to help small businesses. The Fed also created a new Municipal Liquidity Facility to provide up to $500 billion for states and municipalities, backstopped by the Treasury. Many of the terms of these programs have been adjusted in an attempt to make sure the most help was delivered to those most in need. Not everyone is convinced that the optimal mix has been achieved.

It will be fascinating to see how high these ratios are at the end of 2020

What we know about the rescue and stimulus actions of the Treasury and Fed, which are being mirrored across the world, is that government debt levels will increase. What we have also seen is that as the credit markets stabilized following the many Fed actions, corporations have jumped through the window to raise cash to protect their businesses. *The Economist* published an interesting chart showing the ratio of corporate debt to GDP for the U.S. and Eurozone from 2000 through 2019. While the Eurozone started above than the U.S., it has ramped substantially higher. The other interesting point is that the U.S. ratio in 2019 returned to its 2009 peak during the financial crisis. It will be fascinating to see how high these ratios are at the end of 2020.

Exhibit 11. How Debt Is Swamping GDPs



Source: The Economist

Those peaks coincided with the dotcom and housing bubbles

Another interesting chart utilized St. Louis Fed data showing the history of the ratio of nonfinancial corporate debt outstanding to GDP beginning in 1970. As we highlighted in an earlier *Musings*, the growth in all debt categories in the U.S. began to rise immediately after interest rates peaked in 1981, commencing a 40-year slide in rates and bull market for bond prices. Exhibit 12, however, shows previous times when this debt ratio reached a peak of 45%. Those peaks coincided with the dotcom and housing bubbles. The current high ratio is referred to as the "everything bubble." It reflects the zero-interest rate environment since the 2008-2009 Great Recession, as the Fed inflated asset values by repeatedly injecting liquidity.

Another driver for the current bubble has been the corporate tax rate cut, designed to encourage corporate repatriation of untaxed earnings accumulated abroad. This financial maneuvering has also led to companies borrowing to fund share repurchases, a powerful force behind the stock market rise.

Exhibit 12. We Are Toying With Another Financial Bubble

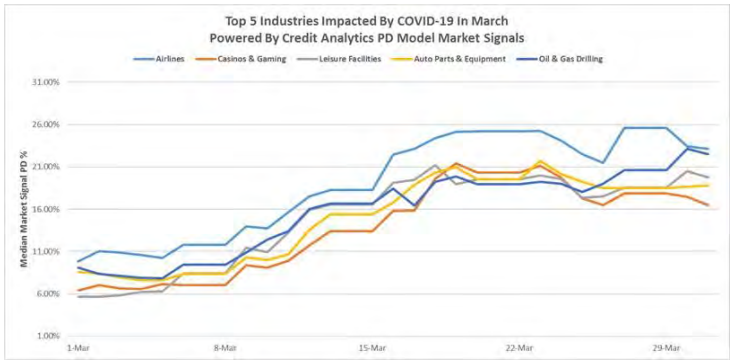
Source: ***Moneymaven.com***

The top five most impacted industries include airlines and oil & gas drilling with the greatest default risk at the end of March

The government's effort to bail out distressed corporations, especially "fallen angels," or companies who have had their credit ratings lowered to junk status, is important for the energy sector. Standard & Poor's credit analysts have calculated the 'probability of default' (PD) in one year for industries that they published in an article highlighting the most and least impacted industries by Covid-19. The top five most impacted industries include airlines and oil & gas drilling with the greatest default risk at the end of March. The conditions of all these industries deteriorated during March as Covid-19 spread and, for oil & gas drilling, the Russia/Saudi Arabia oil war sent crude oil prices sharply lower.

As the S&P analysts pointed out (Exhibit 13, next page), oil & gas drilling began March with a PD of 9.1%, which equates to a triple C+ rating. After the oil-war commenced and the industry faced both a demand and a supply shock, its PD rose to 22.5%, just a triple C rating. It will be interesting to see where the sector's PD is at the end of April, given the recent OPEC+ production cut agreement,

Exhibit 13. How Default Risk Increased In March



Source: S&P

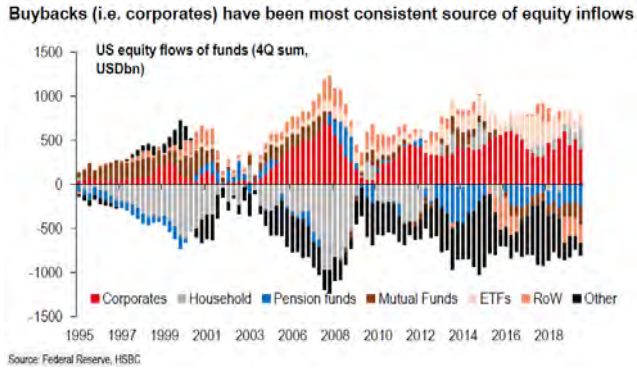
as well as progress in controlling the spread of Covid-19 and the government support for high-yield debt.

This time, besides possible equity ownership, the public is demanding in the various programs that there be five-year limits on dividends, share repurchases and executive compensation

Another issue for energy and the stock market is the impact of stock buybacks on company share prices. One of the many conditions being dictated for major companies receiving Federal financial support is cessation of share buybacks. Companies are also having to give the government (taxpayers) some form of equity interest, such as in corporate bailouts during the 2008 Financial Crisis. As a result of the equity interests and the subsequent recovery in the company share prices, taxpayers actually made money on those bailouts. This time, besides possible equity ownership, the public is demanding in the various programs that there be five-year limits on dividends, share repurchases and executive compensation.

Share buybacks have been a key driver in the rise of the stock market during the past decade. In fact, corporate buying has been the primary source of new capital flowing into the stock market since 2000, with the exception of the Financial Crisis years. It is interesting to note how households have become net buyers of equities after years of being a seller. Recently, ETFs have been another meaningful source of new capital.

Exhibit 14. Where Stock Market Money Came From

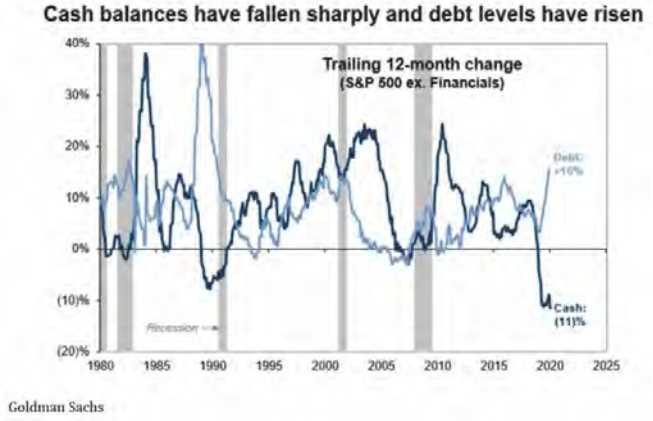


Source: Lance Roberts

Cash balances for S&P 500 Index companies have fallen to the lowest level since 1980, while debt has soared

These large stock buybacks, coupled with increased debt, despite low interest rates, have contributed to a remarkable decline in corporate cash balances. Cash balances for S&P 500 Index companies have fallen to the lowest level since 1980, while debt has soared. Based on how volatile these two measures have become, we wonder whether, following the recession we certainly are in, cash on company balance sheets becomes a prized asset. Likewise, will debt become toxic? Given very low interest rates, something not likely to change anytime soon, will corporate executives adjust how they manage their balance sheets?

Exhibit 15. Corporate Cash Drained To Support Stocks

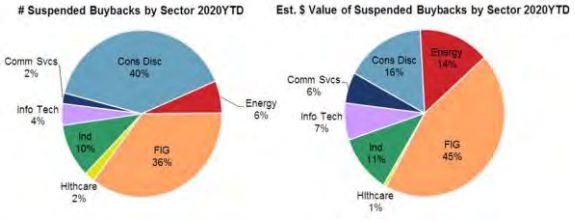


Source: Lance Roberts

The cessation of share buybacks would cut investor return expectations more than in half, and returns will be further reduced to the extent that dividends are eliminated and/or restricted

Traditionally, dividends account for about 2% and share buybacks about 3% of the historical annual average stock market return of 5%. The cessation of share buybacks would cut investor return expectations more than in half, and returns will be further reduced to the extent that dividends are eliminated and/or restricted. That will be a huge blow to investors who sought out stock market returns to replace those lost from bonds due to low interest rates. The neighboring chart shows that about 6% of buyback programs, representing 14% of the expected value of buybacks for energy, have been suspended so far this year. We certainly expect these numbers to rise as the year unfolds, regardless of legal restrictions imposed by government relief payments, due to cash-preservation steps by managements following the oil price collapse.

Exhibit 16. Who Has Stopped Buying Stocks



Source: Lance Roberts

The amount of money spent on energy share buybacks for 2015-2019 was only 31% of the 10-year expenditures

As Exhibit 17 shows, energy in the S&P 500 Index was the fourth lowest sector, ranked by dollars committed to share buybacks. Not a surprise, given the oil price crash of 2014, was the sharp decline in dollars spent on share buybacks over the last five years compared to the last 10 years. The amount of money spent on energy share buybacks for 2015-2019 was only 31% of the 10-year expenditures. We will not be surprised to see the next 5-year period having even less money spent on stock buybacks, unless there is a miracle recovery in oil prices.

Exhibit 17. Dollars For Buybacks By Industry

S&P Dow Jones Indices S&P 500 SECTOR BUYBACKS SECTOR $ MILLIONS	Q4,'19	Q3,'19	Q4,'18	12MoDec,'19	12MoDec,'18	5-YEARS	10-YEARS	Q4,'18 (high)	Q2,'09 (recent low)
Consumer Discretionary	$16,620	$18,372	$25,652	$68,476	$86,674	$420,287	$754,092	$25,652	$2,350
Consumer Staples	$9,429	$7,509	$8,588	$33,838	$33,449	$209,448	$440,320	$8,588	$4,013
Energy	$5,025	$4,880	$8,698	$18,750	$30,427	$82,926	$266,702	$8,698	$5,343
Financials	$50,232	$47,789	$45,641	$178,685	$150,054	$652,120	$906,749	$45,641	$1,170
Healthcare	$20,041	$16,007	$31,336	$83,864	$108,692	$415,445	$711,672	$31,336	$4,699
Industrials	$10,218	$14,181	$23,026	$60,792	$78,239	$348,870	$563,488	$23,026	$1,681
Information Technology	$52,432	$49,241	$61,298	$224,847	$278,526	$882,006	$1,410,197	$61,298	$4,757
Materials	$3,117	$5,400	$5,857	$15,709	$14,391	$59,874	$116,194	$5,857	$159
Real Estate	$573	$894	$1,480	$2,230	$3,768	$10,601	$10,601	$1,480	
Communication Services	$13,687	$11,028	$9,556	$38,192	$20,237	$85,885	$96,656	$9,556	$13
Utilities	$211	$784	$850	$3,355	$1,952	$8,843	$18,082	$850	$10
TOTAL	$181,583	$175,886	$222,980	$728,738	$806,408	$3,163,084	$5,294,754	$222,980	$24,195

Source: Lance Roberts

The unanswered question is how the risk profile for investing in energy stocks may change, as well as investing in the stock market overall?

If we consider what investor returns by sector of the S&P 500 were in the fourth quarter of 2019, energy topped the list with nearly a 10.5% yield. That was nearly 80% greater than the yield of the S&P 500 Index. That will change in 2020, and likely in 2021, as we expect that is how long it will take for the oil market to balance. The unanswered question is how the risk profile for investing in energy stocks may change, as well as investing in the stock market overall?

Exhibit 18. Industry Sector Market Return Components

S&P Dow Jones Indices S&P 500 Q4 2019 Buyback Report			
SECTOR	DIVIDEND YIELD	BUYBACK YIELD	COMBINED YIELD
Consumer Discretionary	2.01%	3.21%	5.22%
Consumer Staples	4.03%	1.95%	5.98%
Energy	7.36%	3.07%	10.43%
Financials	3.22%	6.90%	10.11%
HealthCare	2.02%	2.50%	4.52%
Industrials	2.68%	3.26%	5.95%
Information Technology	1.53%	3.95%	5.49%
Materials	3.02%	2.97%	5.99%
Real Estate	3.60%	0.31%	3.91%
Communications Services	1.77%	1.88%	3.65%
Utilities	3.63%	0.43%	4.05%
S&P 500	2.51%	3.30%	5.81%
Uses full values (unadjusted for float)			
Dividends based on indicated; buybacks based on the last 12-months ending Q4,'19			

Source: Lance Roberts

Credit markets will likely change again, just as they did in 2008-2009. Amazingly, credit markets never reverted to their former selves. The state of today's oil industry is very different from what is was then. Will it ever return to its former health? As Bill Bonner of *Rogue Economics* put it in a recent newsletter:

"The U.S. and Canadian oil industry, for example, has been decimated. Its bonds are going to zero. Most likely, the oil drillers will never recover.

"And who would lend to a U.S. oil producer now?"

"They need high oil prices and low, low borrowing rates. Neither of those things are likely to happen again anytime soon. Oil is cheap. And who would lend to a U.S. oil producer now?"

A good question.

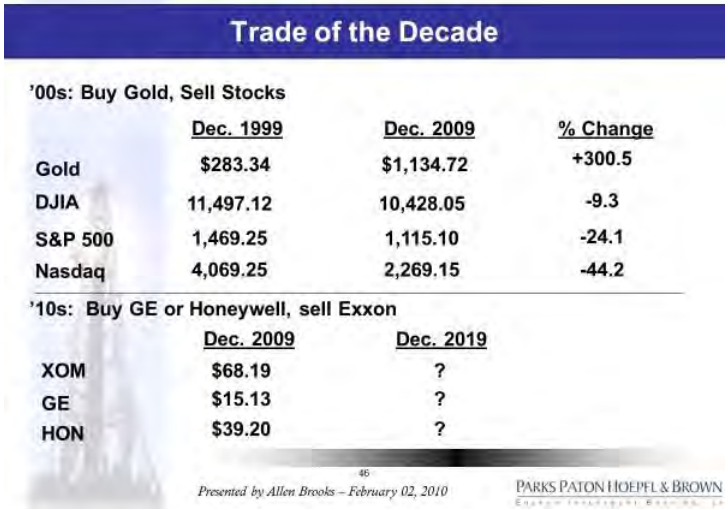
Revisiting The Trade Of The Decade

We were surprised how long ago we began warning of potential problems in the outlook for energy, especially oil and gas

In doing research for a future article on consolidation in the oil patch, we came across copies of slides used in several old presentations we gave to industry gatherings. We were surprised how long ago we began warning of potential problems in the outlook for energy, especially oil and gas. Exhibit 19 is a slide we used for several presentations in early 2010. It was modified after a presentation given by a commodities trader who favored investing in gold. It shows how for the 2000s, gold was the clear winner when compared against the stock market.

We used this approach as a reflection of how we thought the decade might unfold – technology/energy efficiency would trump oil & gas production. Therefore, we suggested selling ExxonMobil in favor of technology/energy efficiency stocks such as General Electric and Honeywell. The slide shows the December 2009 share prices for the three companies with question marks for their 2019 prices. So how did we do?

Exhibit 19. We Were Surprised By The Answer



Source: PPHB

Two of the three stocks rose in value. ExxonMobil went up by 3.1%, or roughly $2 per share. We got GE wrong, as the company's financial businesses and its foray into energy proved costly. GE's shares lost 20.9% of their 2009 value. Our big winner for the decades was Honeywell where the share price soared by 356.3%. Of course, given the virus and oil price war, the overall stock market is lower since the beginning of 2020, as are the share prices for each company.

It viewed as major management "mistakes" the company missing the shale revolution, betting on a large Canadian oil sands expansion, and committing to a joint-venture with Russia

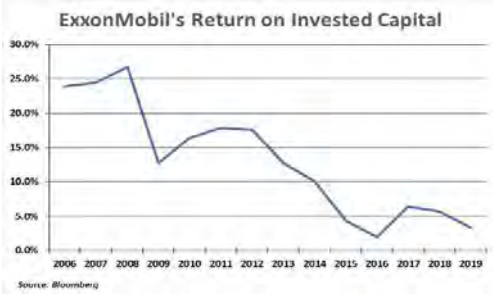
A recent *Bloomberg* article on ExxonMobil and Darren Woods, its head, focused on the strategic moves by the company over the past decade. It viewed as major management "mistakes" the company missing the shale revolution, betting on a large Canadian oil sands expansion, and committing to a joint-venture with Russia. We would agree that ExxonMobil's planning department completely missing the shale revolution was very surprising, which forced former leader Rex Tillerson to overpay in its purchase of XTO Energy. To appreciate where ExxonMobil was in the shale revolution, it was noteworthy ExxonMobil's operations moved under XTO's leadership.

Both the oil sands development and ExxonMobil's Russia project reflected efforts to capitalize on long-standing business relationships. For a company with 135 years of history, and the largest company in the industry, ExxonMobil has always committed to long-term projects with significant resource potential. The company has made major discoveries in Brazil, Guyana, Mozambique, and Papua New Guinea, which offer significant resources with attractive profit potential. While several have been slowed by the current downturn, as well as struggles in negotiating realistic royalty and tax structures, these projects offer significant long-term value.

The primary challenge for ExxonMobil's management is that it is mired in an environment of weak energy markets

The primary challenge for ExxonMobil's management is that it is mired in an environment of weak energy markets. That is shown by the history of its return on invested capital (ROIC). The selection of Mr. Woods to lead ExxonMobil reflected his background in the downstream chemicals business, which is often volatile and operates with skinny profit margins. That may characterize the future of the global oil and gas business.

Exhibit 20. ExxonMobil's Dismal Record of ROIC



Source: *Bloomberg*, PPHB

Not only have financial returns been poor, but share prices have been hurt by the possibility that company assets become "stranded"

ExxonMobil's financial record is not unique in the industry. The industry has had a poor track record for ROIC. This failure has led to the shunning of energy stocks by investors. Not only have financial returns been poor, but share prices have been hurt by the possibility that company assets become "stranded" due to a peak in oil use resulting from government restrictions implemented for dealing with climate change. A long-term perspective on the performance of the energy sector of the Standard & Poor's 500 Index demonstrates the dismal record.

Exhibit 21. How S&P Sectors Have Performed

Annual Sector Total Return vs. S&P 500 (1974 to 2019)

Year	Energy	Materials	Industrials	Consumer Discretionary	Consumer Staples	Health Care	Financials	Information Technology	Telecom Services	Utilities
1974	2.2	5.2	(6.4)	(7.8)	3.5	8.3	2.4	(9.1)	19.4	1.6
1975	(13.2)	9.1	(0.7)	32.3	(2.7)	(26.7)	6.7	(3.5)	(11.7)	15.9
1976	11.2	(0.8)	9.3	(5.9)	(11.0)	(21.9)	11.0	1.5	11.2	10.3
1977	5.3	(15.7)	3.8	(7.7)	3.3	(1.7)	(3.5)	2.5	9.6	17.4
1978	5.2	(5.3)	3.3	(6.2)	(1.1)	2.6	(0.8)	7.9	(0.5)	(11.9)
1979	26.9	14.0	2.0	(9.3)	(14.0)	5.0	(0.1)	(13.0)	(18.9)	(3.9)
1980	42.0	(4.6)	7.8	(14.4)	(17.1)	(1.2)	(15.0)	(15.1)	(29.0)	(15.5)
1981	(18.7)	(3.8)	(7.3)	11.0	22.4	8.3	15.4	(10.5)	39.6	13.8
1982	(33.8)	(12.0)	0.8	27.0	16.0	0.4	3.0	32.6	(7.4)	7.5
1983	3.3	6.6	10.4	(0.5)	(3.6)	(14.9)	(4.1)	4.9	(10.8)	(3.0)
1984	1.8	(13.3)	(7.0)	(2.5)	8.5	0.2	4.4	(7.2)	14.3	20.5
1985	(13.2)	(0.9)	(1.7)	0.3	11.7	11.2	9.2	(8.0)	7.0	(3.6)
1986	(1.7)	7.5	(1.4)	1.8	15.1	11.6	(7.9)	(25.0)	5.7	7.5
1987	3.5	17.1	(2.6)	(3.8)	6.8	1.4	(21.9)	8.9	(0.1)	(12.6)
1988	4.8	(6.4)	(4.2)	8.2	13.2	(3.6)	0.7	(19.0)	4.7	(1.5)
1989	8.7	(9.2)	(4.8)	(10.3)	16.6	11.2	1.7	(37.6)	29.9	6.2
1990	6.7	(8.5)	(3.4)	(10.9)	20.9	17.3	(18.3)	5.4	(12.1)	2.6
1991	(25.2)	(5.5)	(1.0)	(1.6)	17.8	21.6	19.4	(18.0)	(16.4)	(6.5)
1992	(5.3)	2.9	2.0	12.1	(0.8)	(23.2)	15.8	(4.2)	8.8	0.9
1993	2.7	4.5	9.6	10.6	(16.7)	(15.9)	1.1	9.7	4.9	3.5
1994	1.3	4.0	(4.1)	(8.4)	4.5	12.0	(4.6)	18.5	(5.8)	(12.8)
1995	(7.2)	(20.1)	2.2	(15.4)	(0.7)	21.0	16.2	1.0	3.6	(6.1)
1996	2.8	(9.5)	1.9	(9.1)	1.6	(0.8)	13.3	19.3	(22.2)	18.8
1997	(8.6)	(25.4)	(5.7)	(3.8)	3.5	7.9	16.2	(5.3)	7.3	(8.4)
1998	(26.1)	(37.1)	(19.1)	4.5	(5.7)	12.8	(19.5)	48.5	23.0	(14.2)
1999	(6.0)	9.0	(2.0)	(0.1)	(22.7)	(30.4)	(17.3)	56.4	(1.4)	(30.8)
2000	29.1	(8.8)	13.0	(15.2)	14.7	47.3	35.0	(29.4)	(28.9)	67.5
2001	1.0	15.3	4.5	16.5	8.7	(0.2)	3.0	(13.0)	(0.4)	(20.2)
2002	5.9	14.6	(3.7)	(3.9)	15.5	2.9	8.0	(14.7)	(11.7)	0.7
2003	(2.5)	9.7	3.7	6.8	(12.8)	(13.6)	3.5	18.2	(21.7)	(4.5)
2004	20.4	2.8	7.9	0.2	(2.5)	(8.9)	(0.5)	(6.3)	8.4	9.5
2005	26.5	(0.2)	(2.9)	(10.0)	(1.4)	1.1	1.5	(5.1)	(9.3)	9.7
2006	8.5	3.0	(2.3)	2.8	(2.2)	(8.1)	4.0	(7.7)	21.3	6.1
2007	28.9	16.4	6.3	(18.4)	7.7	1.7	(24.1)	11.5	6.0	12.5
2008	1.4	(8.6)	(2.9)	2.9	23.0	13.6	(18.3)	(6.7)	6.0	7.3
2009	(12.4)	21.9	(5.2)	15.9	(12.7)	(7.3)	(10.4)	35.6	(18.1)	(14.9)
2010	5.4	7.2	11.5	12.8	(0.8)	(12.3)	(2.8)	(4.9)	4.0	(9.5)
2011	2.6	(11.9)	(2.7)	4.0	11.9	10.6	(19.2)	0.3	4.2	17.9
2012	(11.4)	(1.0)	(0.7)	7.9	(5.2)	1.9	12.8	(1.2)	2.3	(14.7)
2013	25.1	25.8	40.7	43.1	26.1	41.4	35.6	28.5	11.5	13.2
2014	(9.6)	4.9	7.4	7.3	12.5	23.8	13.1	18.0	(1.4)	25.0
2015	(21.1)	(8.4)	(2.5)	10.1	6.6	6.9	(1.5)	5.9	3.4	(4.8)
2016	27.4	16.7	18.9	6.0	5.4	(2.7)	22.8	13.9	23.5	16.3
2017	(1.0)	23.8	21.0	23.0	13.5	22.1	22.2	38.8	(1.3)	12.1
2018	(18.1)	(14.7)	(13.3)	0.8	(8.4)	6.5	(13.0)	(0.3)	(12.5)	4.1
2019	11.8	24.6	29.4	27.9	27.6	20.8	32.1	50.3	32.7	26.4

Source: FactSet, Goldman Sachs Global ECS Research, S&P, Fidelity, PPHB

Source: PPHB

Its worst years are all associated with downturns in oil prices: 1981, 1985, 1991, 1998, and 2014

We have highlighted (in red) the worst performing sector for each year. The boxes show how industries tend to experience runs of years of either positive or negative performance. While energy hasn't performed well during the past decade, it wasn't always the worst performing sector each year. When one reviews the energy sector's performance, its worst years are all associated with downturns in oil prices: 1981, 1985, 1991, 1998, and 2014. The very poor results in 2018 and 2019 reflected weak oil pricing that impacted the shale industry's returns, as operating costs remained too high. Given the collapse in oil prices this year, it will be

interesting to see if energy winds up at the bottom of the performance ranking at year-end. Energy is currently leading the race to the bottom, and ExxonMobil hasn't helped.

Contact PPHB:
1900 St. James Place, Suite 125
Houston, Texas 77056
Main Tel: (713) 621-8100
Main Fax: (713) 621-8166
www.pphb.com

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