

MUSINGS FROM THE OIL PATCH

June 30, 2020

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:

Will Oil Price Momentum Sustain Long-Term Recovery?

Sometimes oil prices are driven by fundamentals, at other times, measures less directly related such, as the value of the U.S. dollar and the performance of emerging markets, are key. We study those relationships.

[READ MORE](#)

Imagining The Oil Recovery Requires Thinking About Demand

Forecasting demand destruction and its recovery has been a moving target. We look at how it has changed and what forecasters expect will happen. Forecasting long-term demand is critical for predicting oil's future.

[READ MORE](#)

The Future Of The Hamburger: Is It Really On Life Support?

Livestock have been targeted for the pollution they unleash. That criticism originated with a UN report that was flawed. Despite corrections, the myth has been perpetuated. Climate activists want to outlaw meat. Really?

[READ MORE](#)

Cheap Available Coal Continues To Upset Energy Transition

It almost seems as if China and India are in a race to see who can use more coal. China is opening new coal mines, closing smaller ones and burning more coal. India just auctioned 41 coal mines to boost supply.

[READ MORE](#)

Will Oil Price Momentum Sustain Long-Term Recovery?

While we usually focus on fundamental supply and demand trends as we attempt to gauge how the oil and gas business is performing, it is sometimes interesting to revisit a few of the more technical indicators. While we call them technical, suggesting they are primarily financial indicators, they are actually reflections of the fundamentals of oil and gas supply and demand.

We watch the value of the U.S. dollar, along with the performance of emerging markets reflected in various stock market indices

The two measures we follow closely to understand oil price and energy stock trends, are not used for trading purposes, but rather indications of the state of broad forces at work in the global economy and commodity markets. In that regard, we watch the value of the U.S. dollar, along with the performance of emerging markets reflected in various stock market indices. Because oil is priced in U.S. dollars, the value of the dollar determines how much a barrel of oil costs foreigners. When the dollar's value falls, it reduces the cost of a barrel for foreigners, encouraging them to use more. Conversely, when the dollar's value rises, oil prices become more expensive, discouraging its use.

The performance of emerging markets is another important indicator, as it reflects the health of foreign economies. When those economies are doing better, their growth means increased purchases of commodities that are essential to support the growth, and vice versa when economies are weak.

As oil prices crossed \$60 a barrel at the end of 2019 and beginning of 2020, optimism grew that better days were ahead for the industry

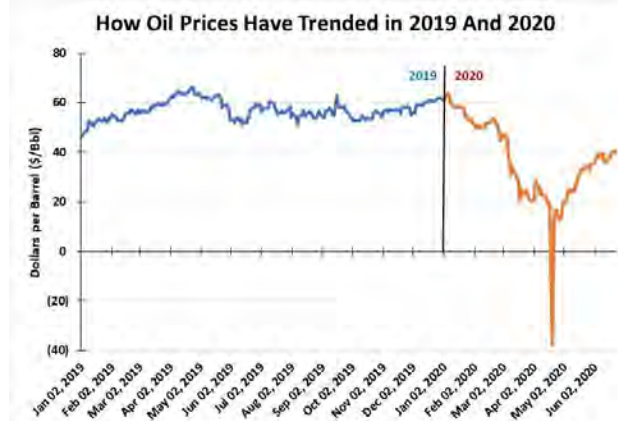
As we assess what these measures are telling us about the future for oil prices, it is helpful to look at where we are. Oil prices in 2019 rose steadily during the first quarter of 2019, before slumping and then essentially remaining flat throughout most of the second half of the year. Prices did rise during the fourth quarter, as they came up from a 2019 low price set early in the quarter. As oil prices crossed \$60 a barrel at the end of 2019 and beginning of 2020, optimism grew that better days were ahead for the industry.

That optimism was soon eroded as people began to doubt the resolve of OPEC and its partners, primarily Russia, to cut more oil output to counter the growing rise in crude oil inventories during the seasonally weak first quarter. Forecasters were warning about the continuing imbalance between supply and demand, arguing that rising inventories would depress future oil prices. Also beginning to haunt the oil market was news from China about the growing spread of the coronavirus. Initially, this was not taken as seriously as it should have been, given the celebration of the Chinese New Year that distorted demand data. However, when the Chinese government began locking down Wuhan where the virus originated, and the virus spread to Italy, alarm bells started ringing about the potential for a global pandemic with serious oil demand erosion implications.

Oil prices were slammed by the announcement that the OPEC+ output cut agreement would not be extended

Concerns over demand destruction grew, as various governments in Europe, Asia and North America began implementing travel bans and economic lockdowns. Predictions for demand losses escalated. At the same time, oil prices were slammed by the announcement that the OPEC+ output cut agreement would not be extended. As a corollary to the dispute between Russia and Saudi Arabia, the two oil giants announced plans to step up their respective outputs and to target the export markets of each other by cutting prices for customers. The oil price rout was on.

Exhibit 1. How Oil Prices Tracked Last Year And Now



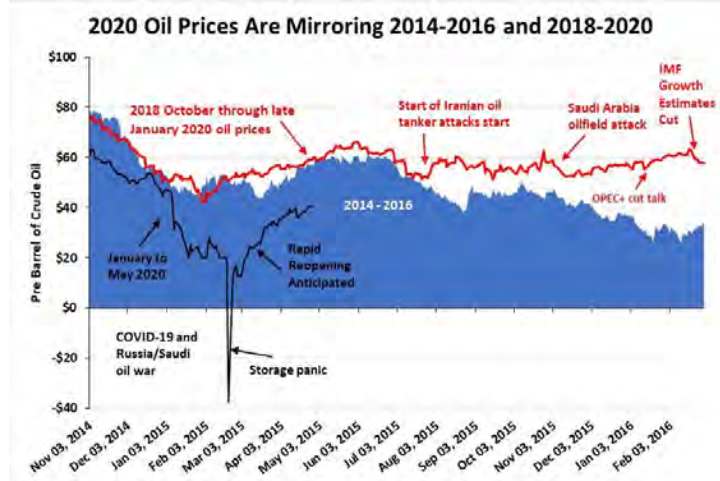
Source: EIA, PPHB

When Saudi Arabia began pumping millions of barrels of additional supply into tankers destined for Asia, Europe and the United States, industry concern quickly shifted to whether the world had sufficient crude oil storage capacity. With demand collapsing, refineries were rapidly trying to adjust their operations, but also seeking storage capacity for unneeded refined product. Storage shortage panic set in, driving oil prices sharply lower.

These naive investors were being taken to the cleaners by pros who held unused storage capacity

The storage panic peaked as we approached the expiration of the April oil futures contract. Many inexperienced investors suddenly found out that if they owned the futures contract at its expiration, they needed to be able to take physical delivery of the thousand barrels of crude oil represented by the contract. Where to put this oil, especially for people with no experience or connections within the real oil business, set off a new panic, which eventually drove the oil price to a negative \$37 per barrel price. This was a first for the industry. Futures contract owners were actually paying others to take their oil! In reality, these naive investors were being taken to the cleaners by pros who held unused storage capacity and were able to lock in significant profits by accepting negative oil prices and then selling the oil forward at significant positive profit margins.

Exhibit 2. Tracking Oil Prices In Recent Downturns

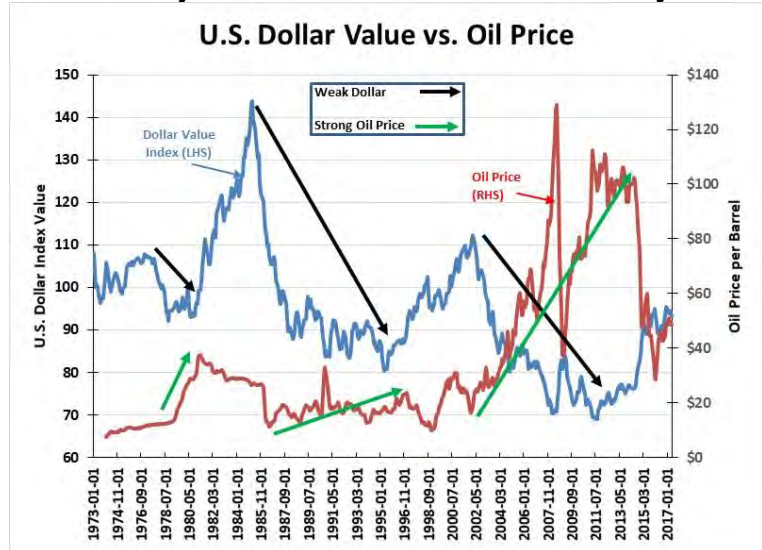


Source: EIA, PPHB

The two prior downturns had mirrored each other for much of their duration

As the oil price rebounded but the fundamental news remained dismal, we focused on how the 2020 oil price performed compared to the 2014-2016 and 2018-2020 price history. The two prior downturns had mirrored each other for much of their duration. The initial 2020 price action was also following the earlier downturns until we entered the storage panic period. Absent the huge negative price spike, the recent rebound has produced a price curve mirroring the early months of the prior downturns. If we are mirroring prior downturns, what can we learn from looking at how the value of the U.S. dollar and the performance of emerging markets impacted oil prices?

Exhibit 3. Major Oil Price and Dollar Value Corollary



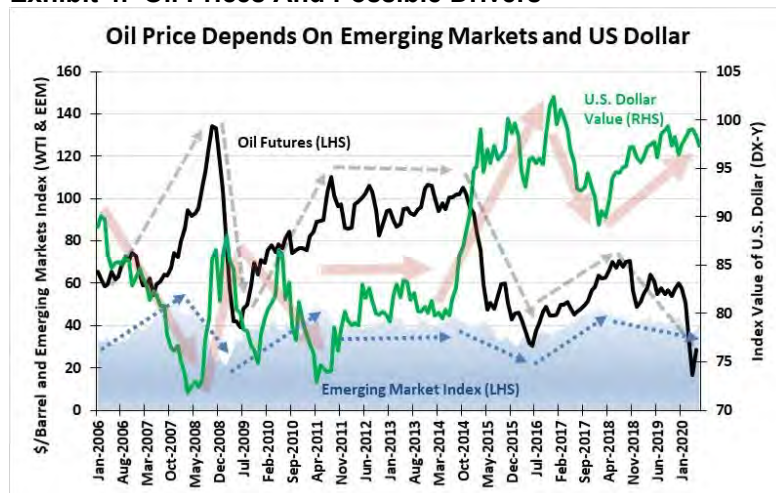
Source: EIA, St Louis Fed, PPHB

All the petrodollars generated by the substantially higher oil price helped boost the value of the dollar to a peak in 1983

Utilizing an older chart covering 1973 to 2017 (Exhibit 3, prior page), we see how oil prices reacted to declines in the value of the U.S. dollar. The chart highlights three declines in the dollar's value associated with oil price increases. The first was during 1975-1980, which coincided with the tripling of oil prices usually attributed to the Iranian Revolution and the loss of a significant volume of global oil supply. All the petrodollars generated by the substantially higher oil price helped boost the value of the dollar to a peak in 1983. The surge in new oil supply and the cheating among OPEC members kept oil prices under pressure, until Saudi Arabia abandoned support for the OPEC marker price and decided to teach its fellow OPEC members a lesson by boosting its production and driving oil prices down. That meant fewer petrodollars being available, causing the dollar's value to collapse. When the dollar's value bottomed in 1995, the long, steady rise in oil prices came to an end.

A similar dollar value decline occurred from 2000 to 2011, and was associated with soaring oil prices. Fundamentally, this period encompassed a jump in global oil demand driven by China's insatiable consumption, and the rapid rebound following the Financial Crisis. The post-crisis demand story was helped by fears of a peak in global oil supply. High oil prices drove the shale revolution and the boom in offshore drilling, bringing into production significant new supplies of oil.

Exhibit 4. Oil Prices And Possible Drivers



Source: EIA, Yahoo Finance, PPHB

The relationships between rising and falling oil prices is tied closely to movements in the value of the dollar and emerging markets performance

We complicate the analysis in the very busy chart in Exhibit 4. Here we are tracking both the dollar's value and the performance of emerging markets, along with oil prices. We have shown the broad trends for each data series with arrows. Again, while we are only covering 2006 to 2020, the relationships between rising and falling oil prices is tied closely to movements in the value of the dollar and emerging markets performance.

The recent pauses in state re-openings due to outbreaks of Covid-19 will depress demand, and thus oil prices

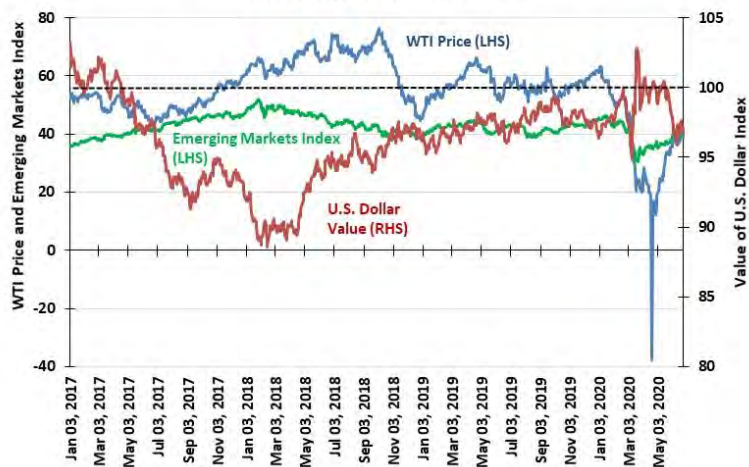
The dollar value index recently spiked above 100, which is the first time since early 2017

Given this correlation, it is interesting to note where we are currently. As the chart shows, we are either just ending a period of U.S. dollar strengthening, or it is a brief downward move in a long-term uptrend. Does the recent recovery in oil prices to above \$40 a barrel suggest a change in trend, or is it a kneejerk reaction to the storage panic that drove oil prices to absurdly low levels? There is little doubt that optimism about the pace of the economic reopening, supported by upticks in daily and weekly activity measures, has helped lift the oil price. The recent pauses in state re-openings due to outbreaks of Covid-19 will depress demand, and thus oil prices. It is important to understand that daily fluctuations in these measures should not be relied upon as triggering reversals of trends, and thereby trading signals.

To that point, we were intrigued to hear a theory expounded on *CNBC* that when the dollar value index goes above 100, it is a trigger for a change in direction that lasts for upwards of three years. We haven't done an extensive examination of this theory, but we did look at it during the past three-plus years. The dollar value index recently spiked above 100, which was the first time since early 2017. From the last time the dollar value index was above 100, we find oil prices now are at about the same level as then. However, during the interval, oil prices spent most of the time above where it was in early 2017. The same pattern appears to be true for emerging markets. The better relative performance was much greater in the earlier portion of the period than in the latter part. That may reflect other events impacting oil prices.

Exhibit 5. Have Higher Oil Prices Been Set In Motion?

How Oil's Price Is Determined By Dollar Value And Emerging Markets Index



Source: EIA, Yahoo Finance, PPHB

As we look at these technical measures, as a guide for the future, we need to consider the fundamentals for crude oil. Although the

As we move through the second half of 2020, concern will grow over the lack of oilfield spending and activity, which would seem to dictate a sharply higher oil price in 2021

long-term oil demand outlook is cloudy, near-term demand is destined to experience a rapid recovery. The news about the economy will be bumpy, but since we are coming off such a significant low point, it is almost axiomatic that we will experience a strong rebound. As we move through the second half of 2020, concern will grow over the lack of oilfield spending and activity, which would seem to dictate a sharply higher oil price in 2021. Whether we get to \$100 a barrel, or J.P. Morgan's \$190, price is less important for the outlook for the industry, as the significantly reduced cost structure of E&P companies will provide them ample money to drill and exercise financial discipline – paying down debt and returning capital to shareholders. The bankruptcy landscape will offer exploration upgrades for those producers who are financially strong. That will translate into more activity, but also better-quality wells. That will become the 2022 story, and will act as a cap on how high oil prices rise. Importantly, investors won't need \$100 a barrel oil to justify backing companies, given the depressed share prices. While the November 3 election remains a wildcard, we are months away from people voting. We have learned from the past four years that events can surprise more than anyone can imagine.

Just as the petroleum industry that exited the 1990s was very different from the one that entered the decade, we are about to witness a similar restructuring

Just as the petroleum industry that exited the 1990s was very different from the one that entered the decade, we are about to witness a similar restructuring. It will set the stage for improved industry fundamentals that will create value, even though the fears over the long-term outlook for the industry will overhang. Remember, stocks rise on walls of worry, and for energy there is plenty to worry about!

Imagining The Oil Recovery Requires Thinking About Demand

For some companies, shifting investment focus away from traditional oil and gas and toward renewables has become a priority

The cataclysmic collapse in oil demand, as governments moved to combat the Covid-19 virus, aggravated by the oil war between Russia and Saudi Arabia, has forced the energy industry to rush to adjust. Actions have included slashing capital expenditures, shutting down producing wells, stopping drilling new wells, and now restructuring operations, which means laying off employees and downsizing organizations. For some companies, shifting investment focus away from traditional oil and gas and toward renewables has become a priority, largely driven by the social mandates of its customers, shareholders and governments.

The initial concern when economies shut down and oil prices collapsed was how to mitigate the tsunami of crude oil speeding to markets that didn't need the additional supply. It was fear of the industry exhausting storage capacity that drove oil prices into negative territory for the first time ever. In hindsight, estimates of oil demand destruction and fear of overflowing storage tanks proved to be overly pessimistic. In some ways, the pessimism was muted by

Recovery scenarios have become the focus for many forecasters, and their scenarios continue to be updated with the latest market data

the involvement of President Donald J. Trump in resolving the dispute between Russia and Saudi Arabia, leading to a sharp, and so far, highly compliant, oil production cut for OPEC+.

Once the market realized the catastrophic outcomes weren't happening, the focus shifted to what the recovery might look like. Recovery scenarios have become the focus for many forecasters, and their scenarios continue to be updated with the latest market data, as well as revised expectations about how quickly economic activity is recovering. Some of the early scenarios were extremely negative, assuming that the virus would force the economic shutdowns to extend well into the summer and even possibly into fall when a second wave of infections might be experienced.

As the reopening of economies has occurred, the oil recovery scenarios are being modified. We are fortunate that the three major oil forecasting groups – the Organization of Petroleum Exporting Countries (OPEC), the International Energy Agency (IEA), and the Energy Information Administration (EIA) – have recently revisited their views about the current oil market state and the recovery.

In the OPEC Monthly Oil Market Report for June, the organization did not make any change to its prior month's projection of a decline of 9.1 million barrels per day (mmb/d) in demand for 2020 compared to 2019. The annual total reflects a decrease in the first half of 2020 of 11.9 mmb/d, but only a 6.4 mmb/d decline during the second half, reflecting a gradual recovery in economic activity toward the end of 2020. They see a moderate first quarter decline coupled with a 17.3 mmb/d second quarter decrease. What we don't know is what OPEC thinks about oil demand in 2021 and beyond.

The organization's demand forecast has been raised by 500,000 barrels per day due to stronger consumption during the Covid-19 lockdowns than previously estimated

The IEA released its June Monthly Oil Report in which it expects demand in 2020 to fall by 8.1 mmb/d from 2019's level. The organization's demand forecast has been raised by 500,000 barrels per day due to stronger consumption during the Covid-19 lockdowns than previously estimated. The IEA also offered its first projection for demand in 2021. It sees demand rising by 5.7 mmb/d from 2020's level. Of course, at 97.4 mmb/d of demand for 2021, it is still 2.4 mmb/d below 2019 levels, although the IEA cautions its projections are subject to change based on the uncertainty about the pace of the economic recovery. To reinforce that point, it says the decline in air travel, which contributed to a 3 mmb/d drop in jet fuel and kerosene in 2020, will lag in recovering such that the IEA projects only a 1 mmb/d increase in 2021, leaving demand well below 2019 levels.

Given the economic uncertainty, forecasters are turning to unlikely data to measure the recovery pace. Rather than rely on monthly retail sales, new home sales, or building permits data, forecasters are now clamoring for more frequent data, which reflects how many

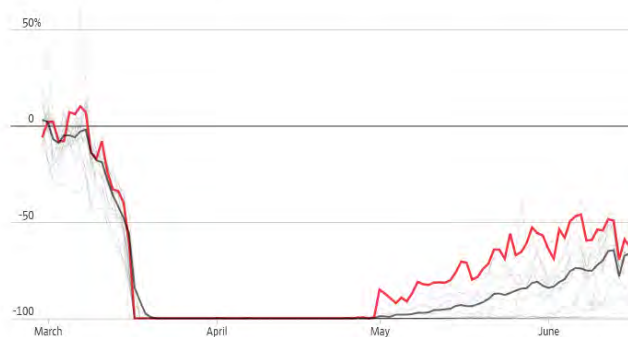
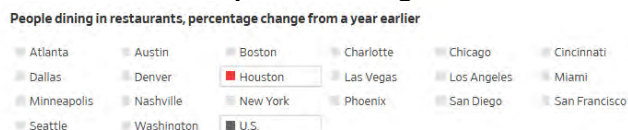
people are engaged in certain activities or how they are spending their money. An article in *The Wall Street Journal* focused on a handful of these daily data measures that, with the aid of smoothing with seven-day moving averages, provides a gauge of how activity has changed since the onset of Covid-19 and the economic shutdowns. The article contained charts covering the following data series:

- People dining in restaurants, percentage change from a year earlier
- Number of travelers who passed through TSA checkpoints
- Apple Maps directions requests in the U.S., change from Jan. 13.
- Foot traffic to businesses, change from early March baseline
- Index of online spending on grocery pickup and delivery services

The one economic series showing a decline is actually down because it was a primary beneficiary of the pandemic and economic shutdowns – grocery pickup and delivery services

While all the data series don't show upward trends, the one economic series showing a decline is actually down because it was a primary beneficiary of the pandemic and economic shutdowns – grocery pickup and delivery services. Given concerns over catching the virus while shopping for groceries, people embraced pickup and delivery services, something grocery stores introduced and/or actively expanded and promoted. The fact that this measure is down is a manifestation of more people actually shopping in grocery stores.

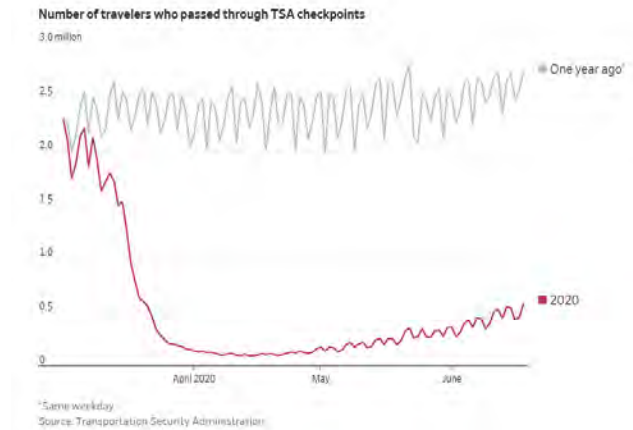
Exhibit 6. More People Are Eating At Restaurants



Note: Data are as of June 18 and based on seated diners at restaurants on the OpenTable network including those with online reservations, phone reservations and walk-ins. Year-over-year comparisons are calculated using the same day of the week for both years.
Source: OpenTable

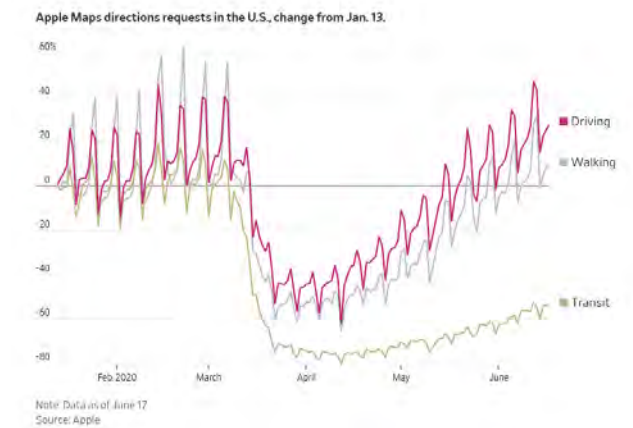
Source: *WSJ*

Exhibit 7. More People Are Flying Today



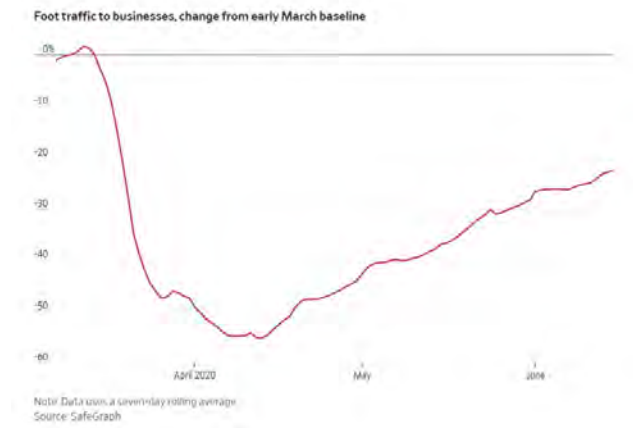
Source: WSJ

Exhibit 8. More People Are Driving Today

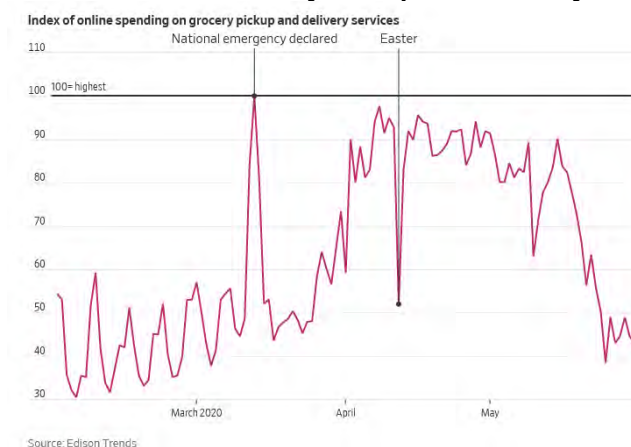


Source: WSJ

Exhibit 9. Shopping Traffic Has Picked Up



Source: WSJ

Exhibit 10. How Grocery Pickup And Delivery Declined**6. New Covid-19 cases**

The share of positive Covid-19 test results and number of Covid-19 deaths nationally have

Source: WSJ

What forecasters don't know, and find impossible to factor into their projections, is whether there will be another wave of the virus and how governments will react

From the energy perspective, the economic data show activity increasing, although at varying paces. Forecasters are assuming these rising trends will continue. What forecasters don't know, and find impossible to factor into their projections, is whether there will be another wave of the virus and how governments will react. The assumption is that there will not be another nationwide lockdown, but rather shutdowns of local hotspots for the virus. This seems to be the case, as virus outbreaks are surging in a handful of states, forcing governors to pause or back-off in re-openings. While this pattern suggests a slowing in the pace of recovery, it likely won't derail the recovery entirely.

In Europe, many governments are embracing green energy as a key part of their economic recovery plans

There are numerous claims being made about what the long-term energy recovery will look like. One of the most recent views was in a recent interview with Bernard Looney, CEO of BP plc., conducted by the *Financial Times*. In February, Mr. Looney, in his first public session with investors and the media after being selected to head the company, announced his new management team and pledged that BP would become net-zero in carbon emissions by 2050, not only for the company but also for the emissions of the BP products burned by customers. With the collapse in energy demand and prices due to Covid-19, the entire future of fossil fuel energy is being questioned as governments figure out how to restart their economies. In Europe, many governments are embracing green energy as a key part of their economic recovery plans. Not only are they considering more solar and wind projects, but hydrogen created from renewables is being tested.

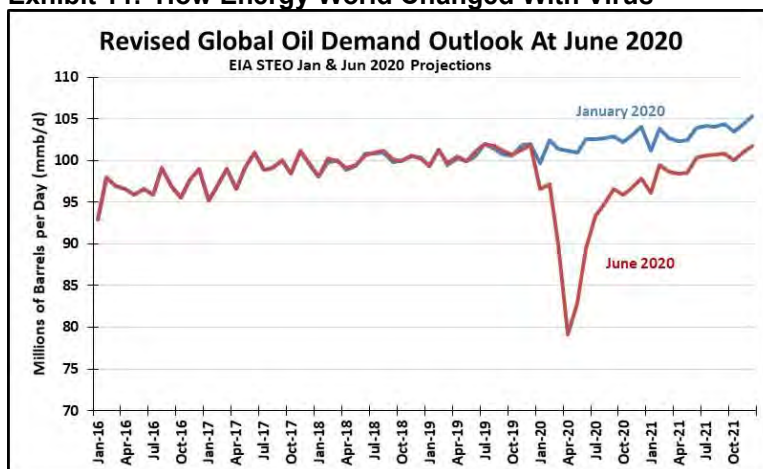
For crude oil, a question has become whether the global economy's recovery from Covid-19 marks the peak in its use? That question was put to Mr. Looney. His response was:

“BL: I don’t think we know how this is going to play out. I certainly don’t know. Could it be peak oil? Possibly. Possibly. I would not write that off. But there are so many things we don’t control. I genuinely don’t know what the future looks like. All I know is it’s uncertain, it’s going to have volatility.”

We know neither the IEA nor OPEC sees peak oil in the immediate future

We know neither the IEA nor OPEC sees peak oil in the immediate future, let alone it having already been reached. What does the EIA believe? Using the January, May and June 2020 Short-Term Energy Outlooks (STEO) we can see just how much the EIA has adjusted its thinking about the future for global oil demand. This is how the January forecast differs from the June outlook.

Exhibit 11. How Energy World Changed With Virus

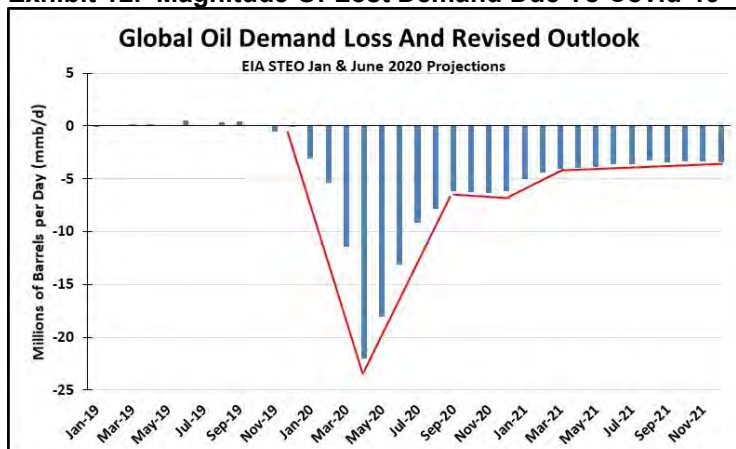


Source: EIA, PPHB

No one would have understood or appreciated the magnitude of the response necessary to tamp down the spread of the virus

Obviously, in January, there was no consideration of a possible global pandemic, even though we knew of the coronavirus outbreak in China. The lack of China’s honest disclosure about the existence of the virus and the ease with which it could spread, kept it off energy forecasters’ radar screens. In all fairness, unless the status of Wuhan had been prominently highlighted, the virus wouldn’t have been factored into any forecasts as early as January. No one would have understood or appreciated the magnitude of the response necessary to tamp down the spread of the virus. Thus, comparing the June forecast against January’s yields the best estimate of the impact of the virus on the future for oil.

What is interesting is to appreciate how sharply oil demand collapsed during the economic shutdown, and now how rapidly it appears to be recovering. That becomes clear when only the monthly differences between the forecasts is shown.

Exhibit 12. Magnitude Of Lost Demand Due To Covid-19

Source: EIA, PPHB

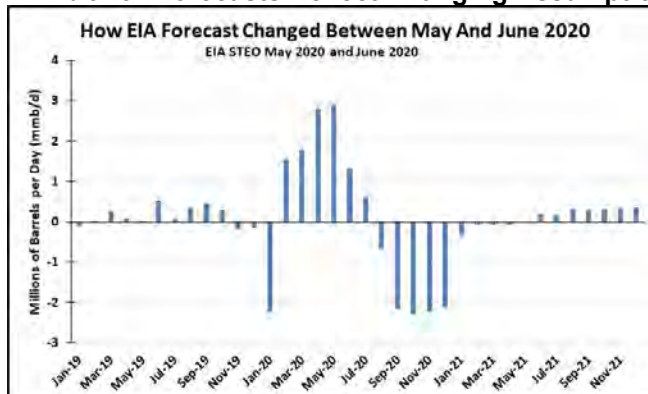
By the end of 2021, however, oil demand is projected to be roughly 4 mmb/d below the pre-Covid-19 forecast

More than 80% of the increase came from gasoline consumption, as the gradual loosening of the stay-at-home orders to prevent the transmission of Covid-19 allowed people to return to work and to begin driving more

While guesses about the magnitude of demand in April, May and June are easier to make, the demand recovery in the remaining months of the forecast period is more difficult to project. What we see is that the EIA expects meaningful monthly demand increases through the balance of this summer, but then demand growth remaining stable to the end of 2020. In 2021, a small demand increase is forecast for the first couple of months before leveling off for the balance of the year. By the end of 2021, however, oil demand is projected to be roughly 4 mmb/d below the pre-Covid-19 forecast.

As a reflection of how rapidly the oil market is changing, according to the American Petroleum Institute, U.S. oil demand in May was 16.2 mmb/d, which was 20% below demand in May 2019. However, it reflected 2 mmb/d of additional demand than in April, for a 14% gain. That was the largest percentage increase for any month since December 1975. More than 80% of the increase came from gasoline consumption, as the gradual loosening of the stay-at-home orders to prevent the transmission of Covid-19 allowed people to return to work and to begin driving more. While the U.S. experience was remarkable, it mirrors what was happening in other countries around the world, depending on the status of their reopening. That is the easy part of the forecast. The harder aspect is figuring out the future trajectory of demand.

While the April/May improvement is noteworthy, we examined how the STEO forecasts for May and June changed in light of the initial recovery data. Presumably, the EIA forecasters were factoring this improvement into their June projections, but what did they do with the later month demand estimates?

Exhibit 13. Forecasts Reflect Changing Assumptions

Source: EIA, PPHB

Oil demand during the latter three-quarters of 2021 is now expected to be somewhat stronger than forecast in the May STEO

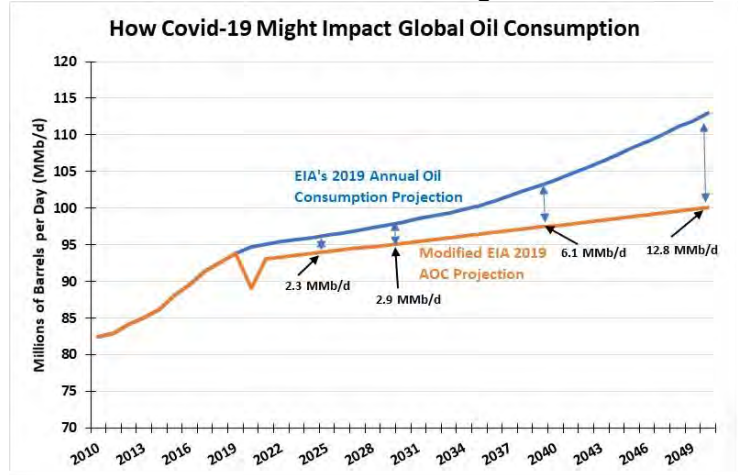
What we see is the demand estimate for the first half of 2020 was greater in the June STEO than what was assumed in May. That improvement appears to disappear during the second half of 2020, likely reflecting expectations for slower economic recovery involving oil-consuming activities such as flying, commuting, and goods shipments. At the same time, oil demand during the latter three-quarters of 2021 is now expected to be somewhat stronger than forecast in the May STEO. Does this reflect EIA's assumption that some of the weaker energy-related activities they foresee during 2H2020 will rebound in the second half of 2021?

Just as in the IEA's revised outlook, the EIA sees a similar pattern of demand decline in 2020 and a strong rebound in 2021. The EIA wrote in the June 2020 STEO: "...consumption of petroleum and liquid fuels globally will average 92.5 million b/d for all of 2020, down 8.3 million b/d from 2019, before increasing by 7.2 million b/d in 2021." The EIA's 2020 demand decline is slightly greater than that forecast by the IEA (8.3 vs. 8.1 mmb/d). However, 2021 is a different story, as the IEA only sees a 5.7 mmb/d growth in demand compared to the EIA's 7.2 mmb/d increase.

It is those assumptions and their differences that will prove critical in predicting long-term future oil demand

The difference between the growth estimates for the two forecasting agencies is equivalent to the average historical annual demand growth. We suspect the difference in the 2021 demand outlooks reflects minor variations in the assumptions about what will drive oil consumption activity. It is those assumptions and their differences that will prove critical in predicting long-term future oil demand. We have attempted to provide some perspective on what might happen, without assuming significant lifestyle and work changes. Not everyone forced to work from home during the shutdowns will continue to do so. They may not venture to their offices every day as before, but they won't remain cloistered at home. Commuting will return, and initially it could have a greater impact on gasoline consumption, as people opt for driving rather than taking mass transit.

Exhibit 14. We See Less Oil Use Long-Term Than The EIA



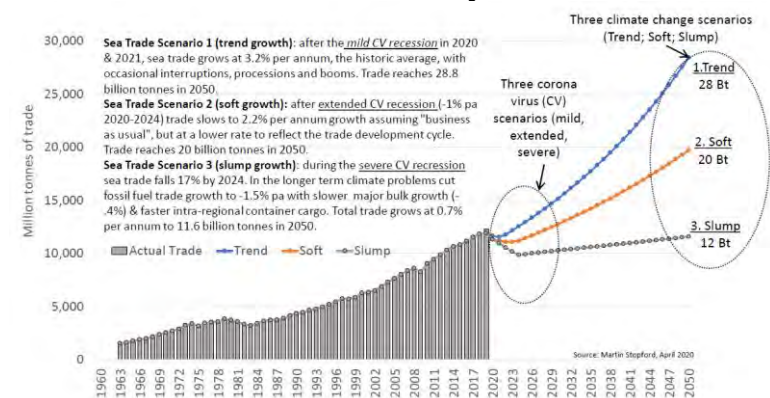
Source: EIA, PPHB

We note that airline and travel executives are predicting it will not be until 2023-2024 before air traffic returns to pre-Covid-19 levels

If we consider where our long-term forecast is compared to the EIA’s outlook, we see a gap in demand of 2.3 mmb/d in 2025. While some might quibble with us. They expect demand to be back on the long-term growth path projected by the EIA by 2025. We note that airline and travel executives are predicting it will not be until 2023-2024 before air traffic returns to pre-Covid-19 levels, so a little slippage in their projections seems entirely possible. While that remains a guess, we would also point out that the planes flying in 2025 will be much more fuel-efficient than those hauling people around the world last year. That will reduce potential demand.

By 2025, corporate supply chains will also be remade, which is likely to translate into less globalization. Previously, we showed the long-term seaborne trade forecasts by Martin Stopford, director of research at shipping consultant Clarkson Research, based on three different outlooks for Covid-19.

Exhibit 15. How Seaborne Trade May Evolve In The Future



Source: Martin Stopford

The Soft scenario projects trade growing 2.2% per year, after declining by 1% over 2020-2024

Under the scenarios, Trend represents a return to the historical growth rate for seaborne trade of 3.2% per year after resuming growth in 2022. The Slump sees the downturn extending out to 2024, as trade falls by 17% during that phase. Afterward, oil and gas trade growth falls to only 1.5% per year. Bulk trade actually contracts, while intra-regional container cargo grows much faster. Overall, seaborne trade grows at 0.7% out to 2050. The Soft scenario projects trade growing 2.2% per year, after declining by 1% over 2020-2024. We tend to favor the Soft scenario as being more representative of how we believe global trade and relative economic growth will unfold. At the same time, we know that the carbon emissions policies impacting shipping's fuel choices is likely to knock 25% off shipping's 4 mmb/d fuel consumption in 2019. This demand loss will come from both more efficient energy use by newer ships, but also the introduction of alternative fuels such as liquefied natural gas and batteries for coastal routes.

The declines in the amount of fuel used for air travel and shipping can explain our long-term demand forecast shortfall compared to the EIA's projection. That decline is before we consider potential demand erosion from increased penetration of electric vehicles in the transportation sector.

There is little doubt oil demand will not be what forecasters predict – including us

There is little doubt oil demand will not be what forecasters predict – including us. The odds, we believe, favor the differences being to the downside. Will the differences be materially greater than we foresee, or less? Only time and additional information about the recovery will provide the perspective to judge oil's long-term outlook.

The Future Of The Hamburger: Is It Really On Life Support?

Impossible Foods founder and CEO Patrick Brown said the meat industry is facing a reckoning

Last Tuesday, on *CNBC's Mad Money* show hosted by James Cramer, Impossible Foods founder and CEO Patrick Brown said the meat industry is facing a reckoning. According to Mr. Brown, the animal-based food market will end within the next two decades, as consumers seek out healthier food options. "From a nutritional standpoint our products match the protein quality and content of the animal products that they replace," he said. "Ours is a clear winner from a health and nutrition standpoint."

Mr. Brown is hopeful of leveraging the perceived advantages of his product. As he told Mr. Cramer, "This is why I think people are increasingly aware plant-based products are going to completely replace the animal-based products in the food world within the next 15 years. That's our mission. That transformation is inevitable." If his view proves correct, what does it mean for carbon emissions?

According to the latest thinking, farming is responsible for the equivalent of 574 and 56 million metric tons of carbon dioxide (CO₂) in the United States and Canada, respectively. That represents

In the United States, 42% of agricultural emissions come from animal agriculture, of which two-thirds of the gases are emitted by ruminants: animals like cows, buffalo and sheep

about 8% of CO₂ emissions for each country. In the United States, 42% of agricultural emissions come from animal agriculture, of which two-thirds of the gases are emitted by ruminants: animals like cows, buffalo and sheep that use bacteria in their stomachs to ferment food. That allows them to eat foods, like grasses, that humans can't, which is significant since according to the United Nations Food and Agricultural Organization (FAO), as much as 70% of all agricultural land globally is range land that can only be utilized as grazing land for ruminant livestock.

This led to the agency's conclusion: Livestock was doing more to harm the climate than all modes of transportation combined

Livestock have been getting a bad rap over its pollution due to mistakes in research some years ago. One mistake was contained in a 2009 analysis by *Worldwatch Institute* that asserted 51% of global greenhouse gas (GHG) emissions come from raising and processing livestock. However, in 2016, the U.S. Environmental Protection Agency reported that the largest sources of GHG emissions were electricity production (28% of total emissions), transportation (28%), and industry (22%). All of agriculture accounted for only 9% of total emissions, with animal agriculture representing only 3.9%, or less than half the sector's emissions.

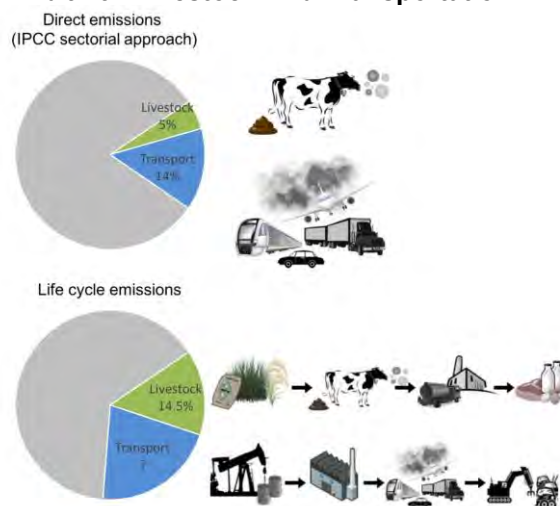
The misconception of the role of animals in GHG emissions emanated from a 2006 FAO report, "Livestock's Long Shadow." The report received widespread attention, and was in first place in a Google search we conducted last week for animal emissions. The FAO report stated that livestock produced 18% of the world's GHG emissions. This led to its conclusion: Livestock was doing more to harm to the climate than all modes of transportation combined.

This led to FAO's comparison of greenhouse gas emissions from livestock, compared to those from transportation, being greatly distorted

The claim was wrong. Its inaccuracy was pointed out by Dr. Frank M. Mitloehner, Professor of Animal Science and Air Quality Extension Specialist at the University of California, Davis, in a 2010 speech. The problem arose from FAO analysts using a comprehensive life-cycle assessment to study the climate impact of livestock, but a different method when analyzing transportation. The report's lead author, Henning Steinfeld, quickly moved to correct the report's conclusion, but most people today seeking information are still being exposed to the wrong conclusion.

The FAO examined all factors associated with producing meat. This included emissions from fertilizer production, converting land from forests to pastures, growing feed, and direct emissions from animals (belching and manure) from birth to death. However, when they considered the carbon footprint of transportation, they ignored climate impacts from manufacturing vehicle materials and parts, assembling vehicles, and maintaining roads, bridges and airports. Instead, they only considered the exhaust emitted from operating autos, trucks, trains and planes. This led to FAO's comparison of greenhouse gas emissions from livestock, compared to those from transportation, being greatly distorted.

Exhibit 16. Livestock And Transportation Emissions



Source: CAES, UC-Davis

Direct GHG emissions from transportation versus livestock can be compared and amount to 14% versus 5%, respectively

Projections show that meat and dairy consumption will grow by 76% and 64%, respectively, by 2050

FAO estimates about 14.5% of global GHG emissions from human activities, or 7.1 gigatons of CO₂ equivalent, can be attributed to the livestock sector annually. This is broadly equivalent to the emissions from all the fuel burned by all the world’s transport vehicles, including autos, trucks, trains, ships and airplanes. There is no comparable full life-cycle assessment for transportation. However, as Mr. Steinfeld pointed out, direct GHG emissions from transportation versus livestock can be compared and amount to 14% versus 5%, respectively. The two comparisons are shown in the accompanying chart, and highlight how animals are not the emissions problem they are often accused of being.

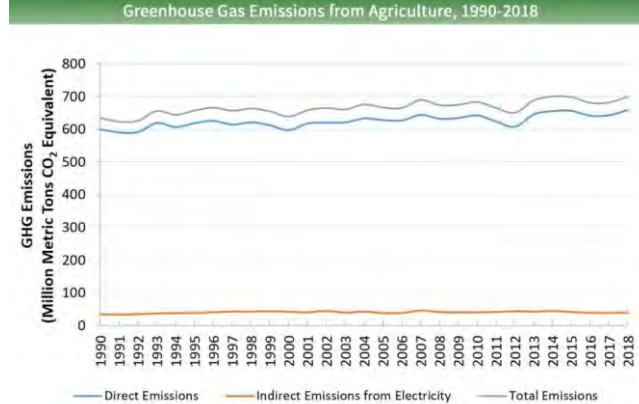
Although livestock are not the pollution problem, it hasn’t deterred critics from leveling the old accusations. *Climate Nexus* states that about 70 billion animals are raised annually for human consumption. This impacts about one-third of ice-free land surface and 16% of global fresh water. Moreover, projections show that meat and dairy consumption will grow by 76% and 64%, respectively, by 2050. That growth is what fuels the fear of pollution risk. They point to data that reportedly says that global GHG from livestock increased 51% between 1961 and 2010. *Climate Nexus* writes:

“If global consumption of meat and dairy continues to grow at the current pace, the agriculture sector could consume about 70 percent of the allowable budget for all GHG emissions by mid-century. To meet the global goal of limiting warming to 2°C, annual emissions must be reduced from today’s levels of 49 gigatons of CO₂ to around 23 gigatons by 2050. Agriculture would use up 20 of those gigatons, leaving only three for the rest of the global economy.”

U.S. data shows less than a 10% increase for all agricultural GHG emissions over the 28 years, 1990-2018

The problem is that the data we have seen from the U.S. EPA for United States pollution from its agricultural sector, which includes livestock, shows a very different story, albeit for a shorter period of time. The historical data for global GHG averages to about a 1% per year increase over the 49 years to 2010. U.S. data shows less than a 10% increase for all agricultural GHG emissions over the 28 years, 1990-2018.

Exhibit 17. U.S. Agricultural Pollution Flat

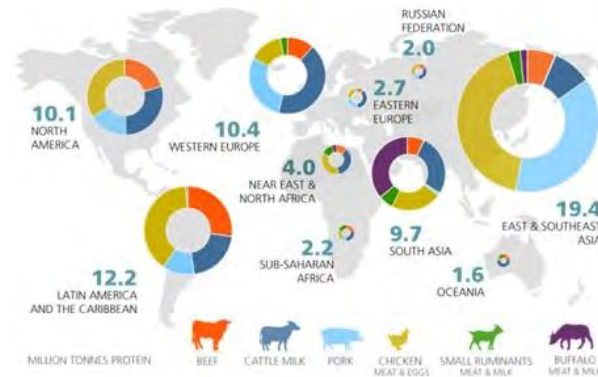


Source: EPA

According to the FAO statistical database, total direct GHG emissions from U.S. livestock have declined 11.3% since 1961, while production of livestock meat has more than doubled

According to Dr. Mitloehner, technological, genetic and management changes that have taken place in U.S. agriculture over the past 70 years have made livestock production more efficient and less GHG-intensive. According to the FAO statistical database, total direct GHG emissions from U.S. livestock have declined 11.3% since 1961, while production of livestock meat has more than doubled. That would seem to go counter to what *Climate Nexus* wrote. This is especially true when one considers that the U.S. accounted for 21% of the 60.9 million metric tons of beef consumed in the world in 2018. The U.S. consumed 50% more beef than China.

Exhibit 18. Global Livestock Production By Type



Source: FAO

The energy in plants that livestock consume is most often contained in cellulose, which is indigestible for humans and many other mammals

In 2015, average annual per capita meat consumption in developed countries was 92 kilograms, compared to 24 kilograms in the Middle East and North Africa and 18 kilograms in Southeast Asia. These differences are significant and argue for why the livestock business will continue to grow.

Many critics of animal agriculture point out that if farmers raised only plants, they could produce more pounds of food and more calories per person. But humans also need many essential micro- and macronutrients for good health, many of which come from beef. The energy in plants that livestock consume is most often contained in cellulose, which is indigestible for humans and many other mammals. But cows, sheep and other ruminant animals can break cellulose down and release the energy contained in this resource. That is critical given that nearly 70% of all global agricultural land is range land that can only be used for grazing ruminant livestock.

The world's population is projected to increase to 9.8 billion by 2050, which will challenge the agricultural industry to feed this many people. Meat is more nutrient-dense per serving than vegetarian options, and allows ruminant animals to utilize feed that is not suitable for humans. Raising livestock also offers needed income for farmers in developing nations. Worldwide, it is estimated livestock provides income for one billion people, an amazing figure.

We remember a number of food fads from the past, often prepared by our mother, a survivor of the Great Depression, that aren't eaten often now

As much as Mr. Brown, the Impossible Foods CEO, believes that plant food will end hamburgers and steaks in the foreseeable future, we remain skeptical. We remember a number of food fads from the past, often prepared by our mother, a survivor of the Great Depression, that aren't eaten often now. Pineapple upside-down cakes, the infamous gelatin salads with fruit and vegetables suspended inside, chiffon cakes, TV dinners, and fondue dinners, are a few food fads that swept the nation to become only occasional recipes today. We're not ready to call meatless hamburgers a fad yet, but we remember when "meatless Friday" meant fish sticks for our classmates. Meatless forever? We doubt it.

Cheap Available Coal Continues To Upset Energy Transition

Electricity is critical to people's existence and the cost of electricity can become a serious hurdle for those trying to climb out of poverty

The economic response to Covid-19 has inflicted significant financial pain on millions of people struggling to climb out of poverty. As a result, governments are seeking ways to employ people and minimize the financial pain from rising everyday expenses. Electricity is critical to people's existence and the cost of electricity can become a serious hurdle for those trying to climb out of poverty.

Why is this significant? The International Monetary Fund (IMF) recently issued revised economic projections for global growth in 2020 and 2021. The fund now expects the world economy to shrink by 4.9% in 2021, compared to its most recent forecast of a 3%

The IMF warned this economic contraction would “imperil” much of the world’s progress since the 1990s in reducing extreme poverty

In our article, we cited the International Energy Agency’s December 2019 report on energy that pointed to coal’s use remaining stable through 2023, with increases in Southeast Asia being offset by lower use in America and Europe

decline. The IMF warned this economic contraction would “imperil” much of the world’s progress since the 1990s in reducing extreme poverty. Moreover, the IMF’s forecast for global growth next year shows that apart from China, economies of neither advanced nor emerging countries, as a group, will exceed their pre-Covid-19 peak size before the end of 2021. If this forecast occurs, it will alter the view that the economic recession American economists anticipate ending soon, may continue longer with greater suffering as a result.

Developing cheap power as a way to help struggling economies recover, while mitigating power bills for their populations, is the goal of many governments. Implementing plans to achieve these goals are leading to a resurgence in coal-fired power plant use and increased coal mining. We wrote about this briefly in our last *Musings* (“Rebuilding Economies After Covid-19 And Fuel Choices,” June 16, 2020), in which we touched on the increasing use of coal in certain countries. In particular, China, Indonesia and India. Very significant was the opening of the last coal-fired power plant in Germany, but also the huge cost of the government’s plan to end coal’s use in generating power in the country, shutting its mines, and cushioning the human suffering for German miners. In our article, we cited the International Energy Agency’s (IEA) December 2019 report on energy that pointed to coal’s use remaining stable through 2023, with increases in Southeast Asia being offset by lower use in America and Europe.

While the IEA’s view about coal’s role in power markets may have been correct then, we wonder how it might assess the outlook now, given the sharp upturn in mine construction in China and the surge in new coal-fired power plants, as well as the recent move by India’s Prime Minister Narendra Modi to stimulate his economy by auctioning permits to open 41 new mines?

Exhibit 19. How India’s Coal Helps Employment



Source: GWPF

India has auctioned 41 coal mines with 17 billion tons of geological coal reserves to enable private companies to commence commercial extraction

India has auctioned 41 coal mines with 17 billion tons of geological coal reserves to enable private companies to commence commercial extraction. All of these mines are largely fully-explored, enabling them to come into production quickly. Four of the mines will be dedicating their coal for use by steel-making plants. The 41 mines represent both large and small mines with peak-rated capacities (PRC) of 0.5 to 40.0 million tons annually (mmt/y). These mines will provide a total PRC of 225 mmt/y when in operation. Given the sizes and locational challenges of some of the mines, we can expect to see more pictures of women hauling baskets of lump coal from the mine to shipment points. This is one way to help the nation’s employment situation.

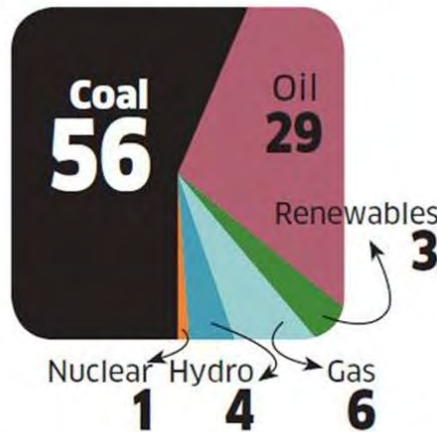
The long-term outlook for India’s energy mix suggests that fossil fuels will remain the dominant supplier

The increased use of coal is designed to help India deal with its economic challenges, of which employment is one aspect. However, lowering, or at least keeping stable, the cost of energy is also crucial for political peace. The impact on India’s climate goals remains an open question. The long-term outlook for India’s energy mix suggests that fossil fuels will remain the dominant supplier. Even if coal, which accounted for 56% of India’s energy in 2017, were to fall below 50%, and all of that decline went to renewables, it would only triple its contribution – rising from 3% to 9%. Making further gains in reducing carbon emissions will become a huge challenge for government policymakers.

Exhibit 20. How India’s Energy Mix Will Change

Coal will Account for Nearly Half of India’s Energy Mix by 2040

Share in primary energy consumption in 2017* (%)

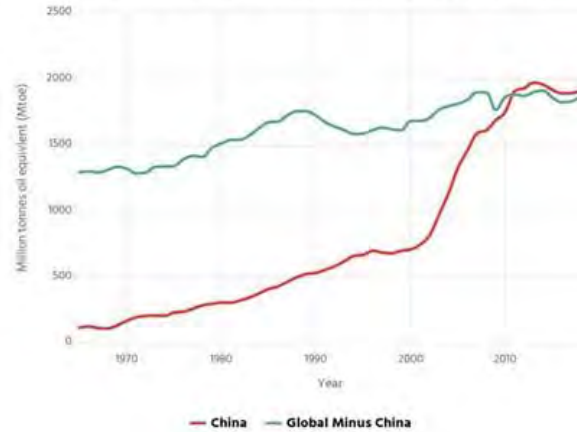


Source: The Economic Times of India
Source: **GWPF**

China still consumes more than half the world's coal

The China story has become more interesting, given that it has become the largest emitter of carbon dioxide and other pollutants, while still paying lip-service to its environmental commitments to the 2015 Paris Climate Accord. China still consumes more than half the world's coal, and that seems likely to remain the condition for a while, despite the large push for renewable power.

Exhibit 21. China Is The Dominant User Of Global Coal
Mainland China vs Global Coal Consumption

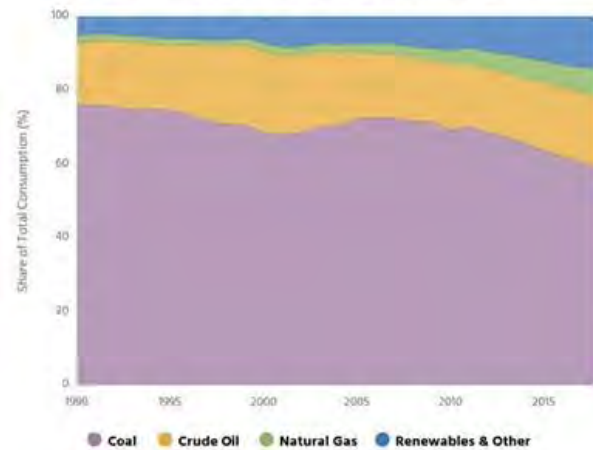


Source: CSIS

Those two new mines will have nearly as much output as China's current coal production, which in 2019 was 3.75 mmt/y.

China recently approved two new coal mines with a combined output of 3.6 mmt/y, at a cost of \$566 million (4 billion yuan). Those two new mines will have nearly as much output as China's current coal production, which in 2019 was 3.75 mmt/y. Behind approving the new mines is the government's plan for shutting down small and outdated mines in favor of larger ones located in coal-rich provinces.

Exhibit 22. How China's Energy Mix Is Changing
Breakdown of China's Energy Consumption



Source: CSIS

Between March 1 and March 18, China permitted nearly 8 GW of new coal-fired generating capacity, which exceeded the 6.3 GW of permitted capacity in 2019

A recent paper in Nature Communications by researchers at Stony Brook University and Lawrence Berkeley National Laboratory suggests China could generate 62% of its electricity from non-fossil fuel sources by 2030

China's energy mix has been trending in favor of renewables, but it may be interrupted as the government deals with reinvigorating its economy after Covid-19 and dealing with the structural shift away from manufacturing in favor of a more consumer-oriented economy. The National Energy Administration is committed to building a clean, green and energy-efficient coal industry. It plans to cap the number of coal mines in the country at 5,000 in 2020. It is also working to shut down mines with annual capacity of less than 300,000 tons. The challenge will be supplying coal-generated electricity growth.

In March 2020, China permitted more coal-fired power plants than during all of 2019. Between March 1 and March 18, China permitted nearly 8 gigawatts (GW) of new coal-fired generating capacity, which exceeded the 6.3 GW of permitted capacity in 2019. That year, it brought on line 43 GW of new coal-fired generating capacity, which was up from 32 GW in 2018, according to *Global Energy Monitor*. To contrast China's commitment to coal, since 2017, the United States has retired 32 GW of coal generating capacity, based on an analysis by *E&E News*. The last U.S. coal plant was built in 2015.

Can China do better? A recent paper in *Nature Communications* by researchers at Stony Brook University and Lawrence Berkeley National Laboratory suggests China could generate 62% of its electricity from non-fossil fuel sources by 2030. The researchers estimated that such a move could lower power bills by 11%. Gang He, a professor of technology and society at Stony Brook and a co-author of the report, said: "Coal had been the default fuel that drives China's economic growth, and renewables are now the new reality. The fast decrease in the cost of solar, wind and storage, and technological innovation has fundamentally changed the economics of renewables." He went on to state: "Our analysis shows that such a fast decarbonization and clean power transition is both technically feasible and economically beneficial." Will China embrace this push? One seems to get mixed messages from the Chinese government about its energy policy and plans. Building more coal mines and coal-fired power plants at the same time it is stepping up renewable energy investment and infrastructure expansion for delivering this power to market appear at odds. For China, mysteries about its economy, government policies and capabilities are nothing new.

Contact PPHB:

1885 St. James Place, Suite 900

Houston, Texas 77056

Main Tel: (713) 621-8100

Main Fax: (713) 621-8166

www.pphb.com

Leveraging deep industry knowledge and experience, since its formation in 2003, PPHB has advised on more than 150 transactions exceeding \$10 Billion in total value. PPHB advises in mergers & acquisitions, both sell-side and buy-side, raises institutional private equity and debt and offers debt and restructuring advisory services. The firm provides clients with proven investment banking partners, committed to the industry, and committed to success.