PPHB
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

Has Oil Industry Just Repeated Spring 2015 Head Fake?

The earlier wave of optimism about an improving oil industry outlook, which had gripped the investment community as crude oil prices ran up to $50 a barrel, was slowly bled away as oil prices declined

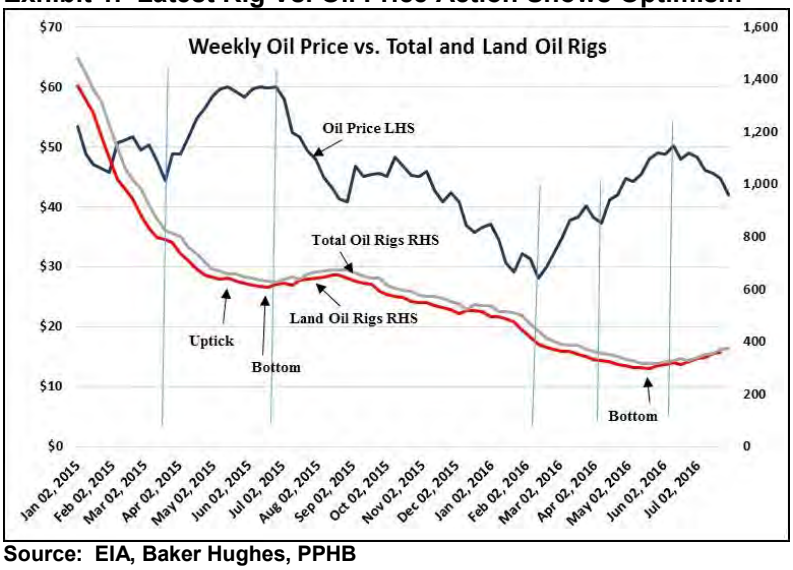
Crude oil prices began the month of August by falling into bear market territory – traditionally defined as a decline in price of 20% or more. In fact, from the June 8th high of $51.23 per barrel, West Texas Intermediate (WTI) fell by 21.8% to close on August 1st at $40.06. That close followed what was a steadily declining oil price trend throughout July. The oil price drop experienced during the final week of July also dragged down the stock market as concerns over the health of global economies associated with oil price movements weighed on stock prices. The earlier wave of optimism about an improving oil industry outlook, which had gripped the investment community as crude oil prices ran up to $50 a barrel, was slowly bled away as oil prices declined. As oil prices rose earlier this Spring, investor optimism grew about how quickly a rebalancing of global oil market could occur. If the oil market balanced sooner than 2017 would translate into higher oil prices in the second half of 2016. This would boost exploration and production industry revenues and cash flows. More money would likely provide sufficient capital, or at least greater financial flexibility, for exploration and production and oilfield service companies to deal with their weakened balance sheets without having to employ bankruptcy options. That growing optimistic outlook prompted investors to begin speculating on how high a price and for how long it needed to be sustained before exploration and production companies began re-employing drilling rigs. Once the “animal spirits” of these companies kicked in, the industry recovery would be well underway. Those beaten-down oil and gas and oilfield service stocks had to be ripe for the picking!

Now that WTI has broken below $40 a barrel, a look back at what has happened in the industry and how it might compare with events during a similar 2015 oil price rally seems appropriate.

Since then the rig count climbed every week

The week that crude oil prices reached their peak in early June marked the second consecutive week that the land oil rig count had increased. The land oil rig count rose the following week before falling in the next. Since then the rig count climbed every week for five weeks, although the land oil rig count for the week ending July 29th increased by only one rig. This pattern of the land oil rig count rising prior to the peak in oil prices contrasts with rig count behavior during the spring 2015 oil price rally.

Exhibit 1. Latest Rig Vs. Oil Price Action Shows Optimism



Source: EIA, Baker Hughes, PPHB

Two months of oil price stability gave investors and industry participants hope

In January and February of 2015, crude oil prices were falling – dropping from the low $50s a barrel at the start of that year into the mid $40s before rising to $50 a barrel in February. The oil price essentially bounced between the high $40s a barrel and the low $50s a barrel over a nine-week span. Two months of oil price stability gave investors and industry participants hope that the industry downturn, which had started when oil prices were $107 a barrel in June 2014 and were accelerating their decline following the disastrous November 2014 OPEC meeting when Saudi Arabia refused to play the role of market balancing agent, was ending.

For some, this price action was proof that the cycle-bottom had been reached and a recovery, much like the V-shaped recovery in early 2009, was underway

In early March of 2015 the stability of oil prices evaporated as they fell to the $43 a barrel range. Investors and commodity traders were convinced that the $43 price marked a cycle bottom, so they immediately jumped in and drove the oil price back into the low $50s a barrel. For some, this price action was proof that the cycle-bottom had been reached and a recovery, much like the V-shaped recovery in early 2009, was underway. If the oil price recovery followed the 2009 pattern, could $75, $85 or even $100 a barrel not be that far off?

Those selecting the shorter time frame marked the cycle downturn as starting with the disastrous OPEC meeting

While some crude oil traders looked upon that price action as a reflection that the industry had just experienced an 8 ½ month price correction, others were questioning whether it was merely a 3 ½ month correction. Those selecting the shorter time frame marked the start of the downturn as the November 2014 OPEC meeting. Those embracing the longer downturn pegged the cycle as starting with the June 2014 oil price peak. The differences in thinking about the length of the cycle probably had a lot to do with how willing or reluctant industry players were in responding to the higher oil price by the time the oil price had rebounded to $50 a barrel.

If you thought the cycle was older, and the recovery shape would be a "V," then you could expect industry players to be aggressive in wanting to get back to work

Investors and traders were quicker to begin superimposing their view of how old the downward oil price cycle was and what the shape of its recovery would be on how industry participants would react. If you thought the cycle was older, and the recovery shape would be a "V," then you could expect industry players to be aggressive in wanting to get back to work. On the other hand, if you thought we were very early into the industry downturn and as a result believed much more time needed to pass, regardless of how you saw the shape of the eventual recovery, you expected industry players to be cautious about ramping their activity back up.

Depending on which letter you favored, it led to specific investment conclusions

As conventional wisdom suggested that the recovery was closer to nine months old, it therefore seemed more likely the downturn was coming to an end rather than just gaining steam. Readers may remember that early in 2015 there was much debate in the media and on Wall Street about the shape of the recovery – V, U, W, or the infamous L. Depending on which letter you favored, it led to specific investment conclusions.

A review of the long-term history of the oil and gas industry shows it goes through cycles that generally occur every seven to ten years

The problem quickly became that not all the industry participants were in agreement as to the duration of the downturn, nor the speed or shape of the recovery, whenever it might come. Some participants viewed this downturn as one of the industry's periodic readjustment exercises. A review of the long-term history of the oil and gas industry shows it goes through cycles that generally occur every seven to ten years. Each of these cycles – while caused by different factors – was unique and resulted in meaningful readjustments. Just as in previous cycles, in this downturn, producers were quick to pull out their defensive action plans and began to act on them. For producers, these plans meant high-grading their portfolios of drilling prospects and to halt drilling uneconomic wells. That step required reducing the number of rigs under contract, which sometimes was a difficult task as long-term contracts needed to be either re-negotiated or canceled via exercising termination clauses that usually required 30-day or longer notices of cancellation. Once these plans were acted on, operators were not about to quickly reverse them. In their minds, if they were wrong about the timing of the cycle and the speed of the recovery and oil prices did continue to climb, they would use their reduced work commitments to address balance sheets that had

deteriorated during the prior boom times, reassess how they were drilling and completing wells in order to reduce future finding and development costs, and possibly re-examine their corporate strategy such as which basins they wanted to target or whether they wanted to emphasis crude oil over natural gas.

As oil prices continued to climb in the spring of 2015, the optimism of investors and traders began to push industry players into embracing a more optimistic outlook

As oil prices continued to climb in the spring of 2015, the optimism of investors and traders began to push industry players into embracing a more optimistic outlook. Those who did embrace that optimism were fighting the actions and rhetoric of major oil company CEOs, such as Robert Dudley of BP Ltd. (BP-NYSE), John Watson of Chevron Corp. (CVX-NYSE) and Ryan Lance of ConocoPhillips (COP-NYSE), who were preaching an oil price scenario of "lower for longer." Their action plans involved protecting their balance sheets by cutting capital expenditures, reducing their overhead, streamlining their organizations, laying off employees, selling non-essential assets, and sustaining their dividends. For many traditional exploration and production companies who had been overspending their cash flows and supporting the activity with borrowings, they either doubled down by spending any incremental cash flow from higher commodity prices on high-output wells in hopes of boosting future revenues even more, or they were forced to begin channeling extra funds into survival actions.

Producers grabbed hold of that optimism way too late

As we see in Exhibit 1, during the Spring 2015 oil price rally, the drilling rig count didn't bottom and begin rising until the price of oil had reached its near-term high. There was one false uptick in the rig count early in the rise of oil prices, but that quickly evaporated. The land oil rig and oil price pattern suggests that it took the entire rally in oil prices before enough producers were finally convinced to succumb to the optimism of investors and traders. In hindsight, producers grabbed hold of that optimism way too late.

The symmetry of the two cycles suggests that oil prices in this downturn are seeking to find a bottom somewhere around the low $40s a barrel

As Mark Twain said, History doesn't repeat but it does rhyme. We found it interesting in tracking the daily price action of the 2015 and 2016 oil price cycles how similar they were, although the current downturn might continue further in the near-term. In 2015, from the March 17th low to the June 10th required 59 trading days. Amazingly, it took 54 days for the oil price cycle to reach its next bottom on August 26th. It is also interesting to note that during the 2015 upturn, oil prices rose by 41.3%, while during the decline they fell by 36.2%. Contrast that pattern with this year's up-cycle that lasted 38 days and produced a 40.9% return, while the downturn lasted 34 days, but only cut oil prices by 18.1%. The symmetry of the two cycles suggests that oil prices in this downturn are seeking to find a bottom somewhere around the low $40s a barrel. Over the nearly 70-year period from 1947 to May 2016, we calculated that the inflation-adjusted average oil price was $44.26 a barrel.

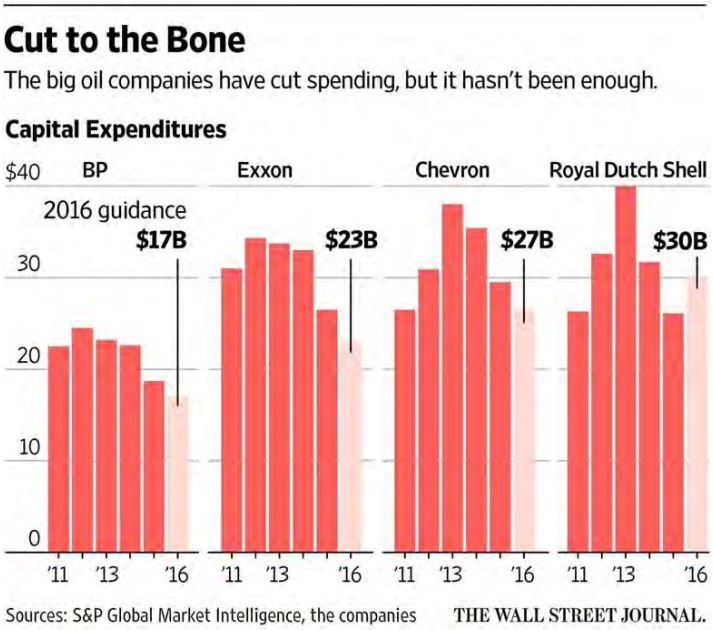
Has this recent run-up in oil prices merely reflected another industry head fake like we experienced in the spring of 2015? Quite possibly

The vow by most producers that in 2017 they will live within their cash flows

it does. That doesn't mean that the industry is destined for another extended period of weak oil prices such as we experienced during the latter half of 2015 and into early 2016. The significant cutbacks in capital expenditures by the oil and gas industry over the past two years and the vow by most producers that in 2017 they will live within their cash flows – meaning funding capital expenditures, meeting debt service and paying dividends (for those companies still paying dividends) while not increasing borrowings – signals that oil and gas production will decline.

Estimates are that the industry has cut upwards of $250 billion in capital spending over the past two years. A chart from a *Wall Street Journal* article dealing with capital expenditures of four major international oil companies showed the cuts those companies have made.

Exhibit 2. Major Oil Companies Leading Capex Cuts

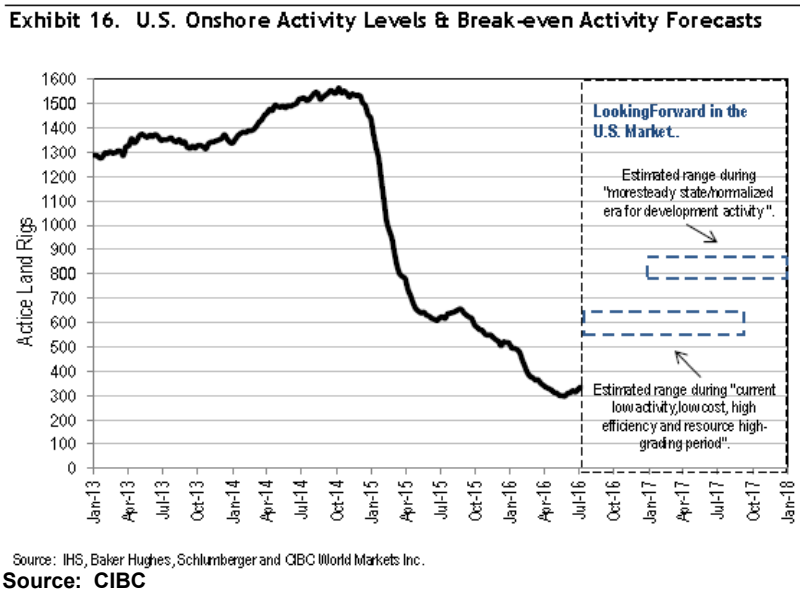


Source: ***The Wall Street Journal***

The estimated gaps are not insignificant

The significance of the spending cutbacks and the 2017 spending vows is reflected in a chart from analyst John Morrison in CIBC's recent oilfield service sector review. The chart (Exhibit 3 on next page) shows an estimate of where the drilling rig count will need to rise to enable the industry to recover under current conditions and under a more normal industry environment. We are not endorsing these estimates, but found the chart visually informative of the likely gap that exists between current rig market conditions and a more healthy industry. The estimated gaps are not insignificant.

Exhibit 3. Where Rig Count Needs To Go To Fuel Supply



Source: CIBC

Failing to adequately and correctly calculate the cost of these new supplies contributed to the boom the industry lived through and the bust it is currently dealing with

The industry recovery will be hampered by the damage that has been inflicted through mal-investment and wishful thinking by producers. Those actions were helped along by the success of the American shale oil and gas revolution that enabled the domestic industry to unlock substantial hydrocarbon resources, albeit with higher costs. Failing to adequately and correctly calculate the cost of these new supplies contributed to the boom the industry lived through and the bust it is currently dealing with. Had global economic growth during the years since the 2008-2009 financial crisis and recession ended approached the historical growth average, the durations of the boom and bust periods might have been different. Ignoring hypothetical scenarios, the reality is that the global oil and gas industry is attempting to reset its internal gyroscope. Unfortunately, this process takes time and often involves trial and error. We would suggest that the recent oil price run to $50 was one of those trial and error events, just as is the correction to sub-$40 a barrel. Hopefully, we will not have to experience many more of those testing attempts.

Challenge For Electric Companies Is Weak Power Demand

A particularly difficult issue for many utilities is the growth of solar panels installed on residential structures

Electric utilities are struggling to redefine their business models to address the rise of renewables that are now mandated by most states in an effort to mitigate climate change. A particularly difficult issue for many utilities is the growth of solar panels installed on residential structures and which produce excess power that the owners are allowed to sell back to the utility company. This is a distributive power system that is the opposite of how electric power companies have been structured. In the case of solar panel, the

The homeowner is not paying anything towards the cost of maintaining the utility's hardware

sale of their power back to the utility company is referred to as net metering. Under those rules in most states, the utility company must purchase the electricity at the same price it charges the consumers when they use it. What this means is that the homeowner is not paying anything towards the cost of maintaining the utility's hardware necessary for receiving and using this power. Therefore, those ratepayers who do not install any rooftop solar panels wind up subsidizing those ratepayers who do.

The primary reason for the higher cost is that renewable power sources such as wind and solar are intermittent

Another problem that utilities have with renewable power is that the power is usually more expensive than the electricity generated from fossil fuels. The primary reason for the higher cost is that renewable power sources such as wind and solar are intermittent and that distorts the calculation of its true economic cost. The costs come from the need for the utility to maintain backup sources of power generating capacity along with the impact intermittent power may have on the stability and operation of the power grid.

This is a convenient metric for comparing different power generating technologies

Exhibit 4 on the next page shows the levelized cost for power generated by different fuels and systems according to the U.S. Department of Energy as reported in the Energy Information Administration's Annual Energy Outlook 2015. Before examining the particular power costs, it is important to understand what levelized cost of electricity (LCOE) is. LCOE is the per-kilowatt-hour cost of building and operating a generating plant over its financial life. Key inputs for calculating LCOE include capital costs, fuel costs, fixed and variable operations and maintenance costs, financing costs, and the utilization rate for each plant type. This is a convenient metric for comparing different power generating technologies, as it allows comparison of plants with different cost structures and utilization rates. LCOE can also be regarded as the minimum cost at which electricity must be sold in order for a project to breakeven.

The problem with LCOE is that it treats all kilowatt-hours of electricity supplied as a homogenous product with a single price

The problem with LCOE is that it treats all kilowatt-hours of electricity supplied as a homogenous product with a single price. It ignores the reality that the value of electricity supplied is time and location specific. LCOE assumes that the kilowatt-hour of electricity produced by a conventional power plant is the same as that provided by a renewable plant, but the former output is guaranteed while the latter is not. LCOE ignores the cost for providing back-up power supplies for intermittent renewable power and of the networks required to integrate it. Thus, when one examines the power cost by fuel in Exhibit 4 (next page), understand that the estimates for renewables tend to understate the true cost of its output. The growth in consumption of renewable power is impacting the cost of electricity and, as economics teaches us, higher costs for a product discourage its consumption.

Exhibit 4. Levelized Cost Of Electricity By Fuel Source

U.S. Average Levelized Costs (2013 $/MWh) for Plants Entering Service in 2020[1]

Plant Type	Capacity Factor (%)	Levelized Capital Cost	Fixed O&M	Variable O&M (including fuel)	Transmission Investment	Total System LCOE	Subsidy[2]	Total LCOE including Subsidy
Dispatchable Technologies								
Conventional Coal	85	60.4	4.2	29.4	1.2	95.1		
Advanced Coal	85	76.9	6.9	30.7	1.2	115.7		
Advanced Coal with CCS	85	97.3	9.8	36.1	1.2	144.4		
Natural Gas-fired								
Conventional Combined Cycle	87	14.4	1.7	57.8	1.2	75.2		
Advanced Combined Cycle	87	15.9	2.0	53.6	1.2	72.6		
Advanced CC with CCS	87	30.1	4.2	64.7	1.2	100.2		
Conventional Combustion Turbine	30	40.7	2.8	94.6	3.5	141.5		
Advanced Combustion Turbine	30	27.8	2.7	79.6	3.5	113.5		
Advanced Nuclear	90	70.1	11.8	12.2	1.1	95.2		
Geothermal	92	34.1	12.3	0.0	1.4	47.8	-3.4	44.4
Biomass	83	47.1	14.5	37.6	1.2	100.5		
Non-Dispatchable Technologies								
Wind	36	57.7	12.8	0.0	3.1	73.6		
Wind – Offshore	38	168.6	22.5	0.0	5.8	196.9		
Solar PV[3]	25	109.8	11.4	0.0	4.1	125.3	-11.0	114.3
Solar Thermal	20	191.6	42.1	0.0	6.0	239.7	-19.2	220.6
Hydroelectric[4]	54	70.7	3.9	7.0	2.0	83.5		

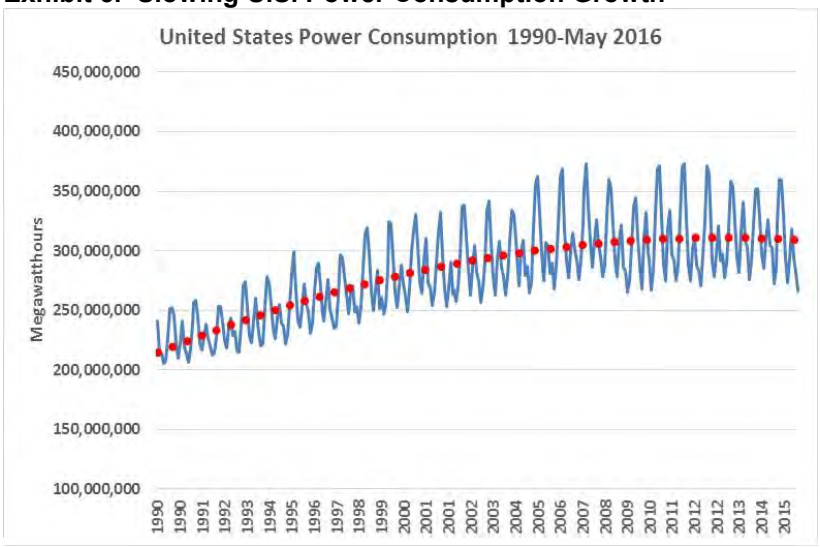
[1] Costs for the advanced nuclear technology reflect an online date of 2022.
[2] The subsidy component is based on targeted tax credits such as the production or investment tax credit available for some technologies. It only reflects subsidies available in 2020, which include a permanent 10% investment tax credit for geothermal and solar technologies. EIA models tax credit expiration as follows: new solar thermal and PV plants are eligible to receive a 30% investment tax credit on capital expenditures if placed in service before the end of 2016, and 10% thereafter. New wind, geothermal, biomass, hydroelectric, and landfill gas plants are eligible to receive either: (1) a $23.0/MWh ($11.0/MWh for technologies other than wind, geothermal and closed-loop biomass) inflation-adjusted production tax credit over the plant's first ten years of service or (2) a 30% investment tax credit, if they are under construction before the end of 2013. Up to 6 GW of new nuclear plants are eligible to receive an $18/MWh production tax credit if in service by 2020; nuclear plants shown in this table have an in-service date of 2022.
[3] Costs are expressed in terms of net AC power available to the grid for the installed capacity.
[4] As modeled, hydroelectric is assumed to have seasonal storage so that it can be dispatched within a season, but overall operation is limited by resources available by site and season.
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2015*, April 2015, DOE/EIA-0383(2015).

Source: EIA

While power use continued to grow at a slow rate up until the 2008-2009 recession, since then consumption growth has slowed even more

We examined the amount of power consumed in this nation from 1990 through May of 2016. Exhibit 5 on the next page shows how power consumption grew steadily through the first half of the 1990s, but then began to slow slightly as we reached the 1998-1999 recession and the ending of the dot-com boom. The early 2000s saw power consumption growth slow further as we navigated through the 9/11 induced economic shock and recession. While power use continued to grow at a slow rate up until the 2008-2009 recession, since then consumption growth has slowed even more. In fact, in recent years power consumption has actually declined slightly. This growth pattern reflects the impact of different factors at work within the primary power market sectors that are not evident in the aggregate consumption analysis.

Exhibit 5. Slowing U.S. Power Consumption Growth

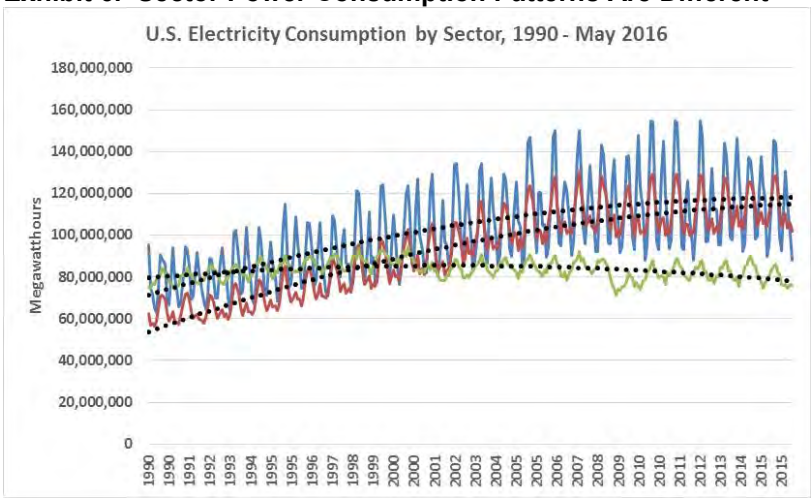


Source: EIA, PPHB

Both residential and commercial power consumption have experienced slowing growth as we moved into the 2000s

To understand what may be happening within the overall electric market, we studied the history of power consumption by sector – residential, commercial and industrial. Again, we plotted the sector consumption data and then calculated trendlines for each one. Both residential and commercial power consumption have experienced slowing growth as we moved into the 2000s, but the demonstrated growth rates were slightly faster in recent years than the consumption growth rate reflected in the overall market trend we plotted above. The explanation for this disparity in growth rates is the impact of the fall in consumption by the industrial power sector, which is clearly evident in Exhibit 6.

Exhibit 6. Sector Power Consumption Patterns Are Different

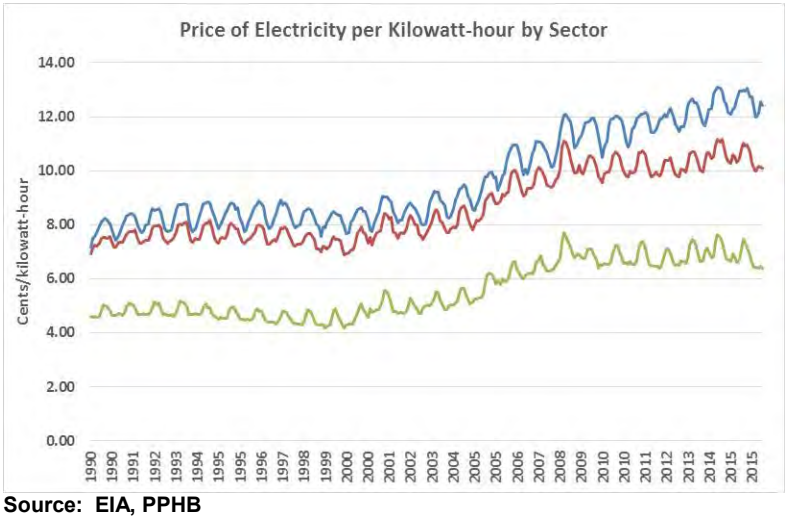


Source: EIA, PPHB

From that time forward, the industrial and commercial sectors experienced flat to slightly lower prices while prices in the residential sector continued climbing

The most interesting dynamic within these power sectors is the trend in electricity pricing during the time frame studied. As shown in Exhibit 7, all three sectors experienced significant price hikes over the entire 1990-2016 period. However, between 1990 and 2000, power prices in the three sectors actually declined, which may have contributed to the faster growth in consumption we had noted above. After 2000, power prices for all three sectors began climbing until they reached a peak in 2008. From that time forward, the industrial and commercial sectors experienced flat to slightly lower prices while prices in the residential sector continued climbing. Why such a disparity in price trends? We would suggest it may have a lot to do with the state clean-energy mandates and the push by the Obama administration for greater wind and solar power use. As the volume of wind and solar in our power supply has grown during 2008-2016, electricity costs have increased and residential customers have few options to counter the higher electricity rates compared to the options available for commercial and industrial customers.

Exhibit 7. Residential Power Price Rises Faster Than Others



Source: EIA, PPHB

Solar panel providers trumpet how much the cost of panels have declined in recent years and how much further those costs will decline in the future

One of the key attributes about solar panels that is marketed by companies supplying them is the impact home-generated power may have on consumers' utility bills. Solar panel providers trumpet how much the cost of panels have declined in recent years and how much further those costs will decline in the future. Of course, these future cost claims don't have much impact on consumers who have already installed solar panels on their homes. Those cost claims come at a time when solar power is still much more costly than any other form of power. What solar panel systems offer homeowners are financial options to hold down the cost of a system's installation or possibly third-party leasing arrangements that may further reduce a homeowners' monthly power cost. The existence of meaningful investment tax credits from the federal government for solar installations has created financial opportunities for third-parties to

This is just one more example of where our zero interest rate monetary policy is creating unintended consequences

create instant value from leasing installations in which the tax credits are sold. In today's very low interest rate environment, the cost of capital for these third-party solar system installers can lead to very high rates of return on investment with minimal risk because of the rapid project payback. This is just one more example of where our zero interest rate monetary policy is creating unintended consequences – disrupting the traditional utility business model and potentially putting many homeowners at risk of price shocks when, and if, the Federal Reserve acts to lift short-term interest rates.

We expect to see a number of different utility business models evolve as industry executives experiment with reconfiguring electric power generating companies

Higher electricity prices and cheap solar financing may be tickets to cutting residential demand growth. Higher electric prices have already driven commercial and industrial users to seek alternative power suppliers and/or to shut down or relocate operations. All of these forces are pressing utility executives to modify their business models in response to the disruptive market forces of renewable fuels. Going forward, we see few events that will radically alter these current market trends, other than potentially a sharp economic contraction or a rapid shift away from easy money policies. Therefore, we expect to see a number of different utility business models evolve as industry executives experiment with reconfiguring electric power generating companies that can deal with a different business environment than expected merely a decade ago. We will be anxiously watching the paths these companies select and how their journeys go.

Will 2016 Be The Year Oil Industry Gets Hit By Hurricanes?

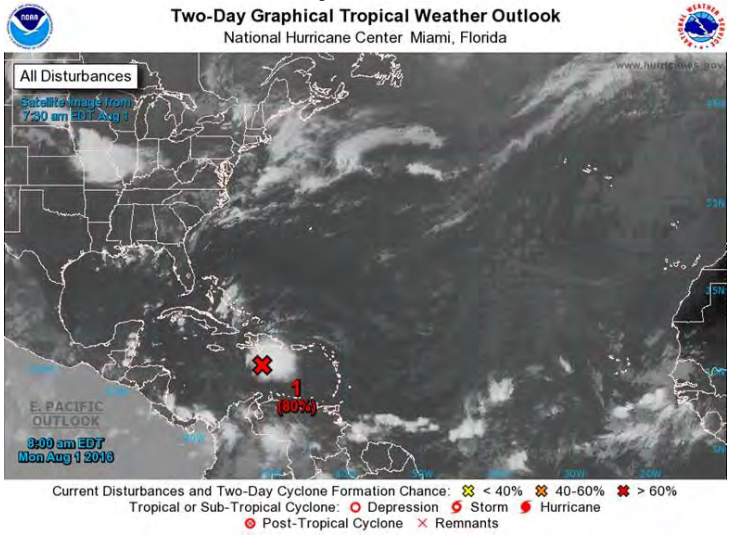
We are now entering the three-month span when tropical storm and hurricane activity is at its highest level

As of August 1st, there was one tropical disturbance in the Atlantic Basin making its way from the coast of West Africa to the Caribbean Sea and potentially into the Gulf of Mexico. By last Friday, Tropical Storm Earl was targeting Mexico. We are now entering the three-month span when tropical storm and hurricane activity is at its highest level, even though this year saw the unusual phenomenon of a January hurricane (Alex). In addition to that storm, we have experienced three named storms so far this year. Merely two days earlier there had been two tropical disturbances in the basin, but one of those disturbances clearly has disintegrated, although they have been known to reform if water and weather conditions are favorable.

There are several areas of clouds located to the west of the coast of Africa representing potential future disturbances and eventual tropical storms and hurricanes

The current tropical disturbance making its way into the Caribbean Sea was showing a better defined circulation pattern with winds in the 40-45 miles per hour range. The National Oceanic and Atmospheric Administration (NOAA) gives the disturbance a greater than 80% change of becoming a tropical storm within the next 48 hours. [It did.] The location of the storm is shown in Exhibit 8 on the next page. Note also that there are several areas of clouds located to the west of the coast of Africa representing potential future disturbances and eventual tropical storms and hurricanes.

Exhibit 8. Hurricane Alley Is Not Too Active



Source: NOAA

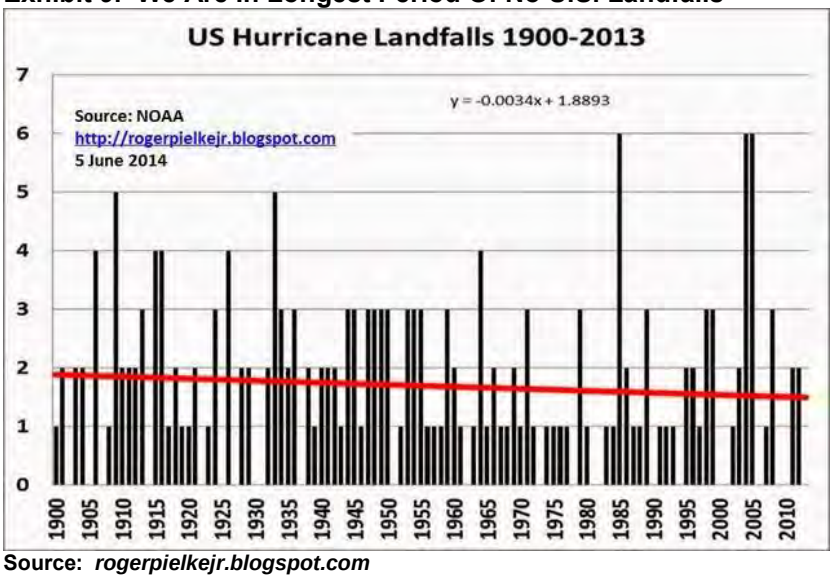
These production interruptions, however, might provide the industry with some help in curtailing U.S. output

Meteorologists who specialize in tropical storm forecasting and monitoring have been predicting that the 2016 storm season will be an average season suggesting that there will be a greater number of tropical storms than experienced in recent years. That is not a good omen for the oil and gas industry operating in the Gulf of Mexico, or along the U.S Gulf Coast. Even without damage to producing facilities from a storm, every time one of them enters the Gulf of Mexico producers are forced to prepare for the storm by shutting in production and evacuating personnel. That means the companies experience a loss of revenues and increased operating expenses – not a favorable outlook for an industry struggling with low oil and gas prices. These production interruptions, however, might provide the industry with some help in curtailing U.S. output that has contributed to the global oil and natural gas supply gluts that have depressed commodity prices.

As of late July, the U.S. has gone 10.8 years since the last Category 3 or greater hurricane (on a scale of 1-5) made landfall in the U.S.

Why will the tropical storm season of 2016 be closer to an average year? Importantly, the questions are whether a more active storm year translates into a greater number of storms in the Gulf of Mexico, whether the storms are more intense, and importantly, whether the storms make landfall along the U.S. Gulf Coast. According to Chris Hebert with *StormGeo* in a recent webinar, the peak in the hurricane season is September 10th, with the period from mid-August to early September being the time of sharpest activity increases. Mr. Hebert's research shows that as of late July, the U.S. has gone 10.8 years since the last Category 3 or greater hurricane (on a scale of 1-5) made landfall in the U.S. That storm was Category 3 Hurricane Wilma that hit the Florida Gulf Coast on October 24, 2005. Prior to this recent hiatus, the longest the U.S. had gone without a severe hurricane making U.S. landfall was a 6.1 year period in the early 1900s.

Exhibit 9. We Are In Longest Period Of No U.S. Landfalls

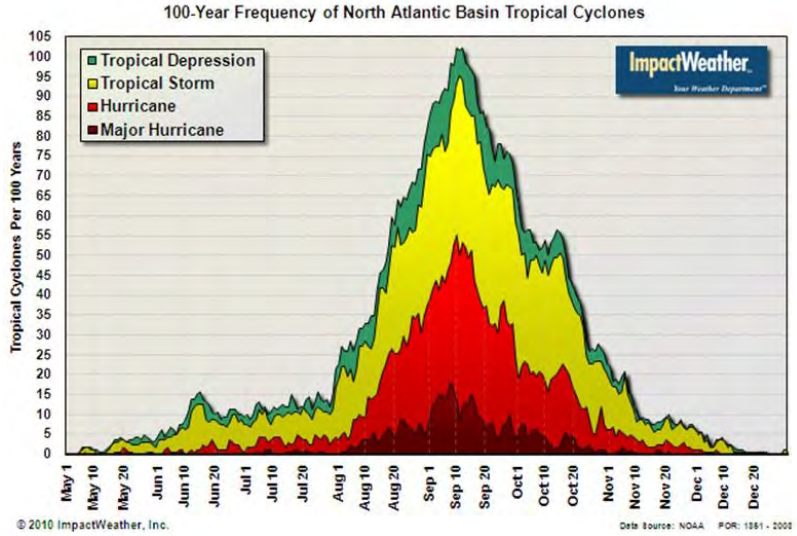


Source: ***rogerpielkejr.blogspot.com***

This eight-year span is remarkable as historically we have experienced one in every two years

The last hurricane in the Gulf of Mexico was in 2013, which is unusual since there is on average one every year according to NOAA. The last major hurricane in the Gulf of Mexico was Hurricane Gustav in 2008. This eight-year span is remarkable as historically we have experienced one in every two years, again according to NOAA data. As shown in Exhibit 9, the history of U.S. hurricane landfalls show widely varied activity levels during 1900-1932 with various multi-year periods of no landfalls. According to the chart, which only goes through 2013, there were multi-year gaps in the early 1980s, around 2000 and between 2008 and 2011.

Exhibit 10. We Have Entered Most Active Period For Storms



Source: ImpactWeather

As the history of tropical storms in the Atlantic basin shows, the peak in activity is September 10th. The monthly period from about August 10th to September 10th shows the greatest rate of increase in storm activity. So we are on the cusp of the most active storm period. In Mr. Hebert's presentation, the reason why his group is anticipating a more active season relates to the changing meteorological conditions impacting the favorability for storm formation and strengthening. In particular, the Bermuda high that has been blocking storms from moving further north, i.e., reaching the Gulf of Mexico and/or turning north and traveling up the East Coast of the United States. The strong Bermuda high has prevented initial tropical disturbances from forming further north that would allow them an easier route to the U.S.

The strong Bermuda high has prevented initial tropical disturbances from forming further north that would allow them an easier route to the U.S.

Other important conditions impacting storm formation include wind shear, which is currently higher than normal but is forecast to become calmer and below normal in the tropics. A reason for this shift is the rapid decline in the South Pacific Ocean's La Niña weather phenomenon, which contributes to increased wind shear in the Atlantic basin. We are now closer to a La Niña weather phenomenon forming, which usually means less wind shear. The importance of wind shear is that it acts to break down the uplifting currents that help strengthen tropical disturbances. The other factor impacting storm formation is sea surface temperatures, which at the present time are below normal in the northern portion of the Atlantic basin although they are slightly warmer than normal in the southern portion. If those conditions continue, they would dampen storm formation and storm strengthening.

The importance of wind shear is that it acts to break down the uplifting currents that help strengthen tropical disturbances

Mr. Hebert says that their forecast calls for an additional 12 named storms, seven hurricanes and four major hurricanes to go with the one hurricane and three named storms already experienced. As with virtually all other tropical storm forecasters, *StormGeo* looks at analog years to adjust their forecast by their similarity current conditions. They used an interesting group of years – 1995, 1999, 1955, 1998, 2000, 2007 and 2011. These years give an average forecast for named storms, hurricanes and major hurricanes of 15.6, 8.7 and 4.6, respectively. Those analog year averages compare with *StormGeo's* projections for 16 named storms, eight hurricanes and four major hurricanes. Interestingly, the hurricane forecasters at Colorado State University in their August 4th update call for 15 named storms, six hurricanes and two major hurricanes.

These years give an average forecast for named storms, hurricanes and major hurricanes of 15.6, 8.7 and 4.6, respectively

When we examined a report written in 2011 by several scientists with the National Hurricane Center, a division of NOAA, they presented two tables - one showing the maximum and minimum activity for tropical storms, hurricanes and major hurricanes and the other showing storms making landfall on the U.S. coastline. The information in the report confirmed most of the observations of tropical storm forecasters. In fact, when examining the listing of maximum activity years, one finds many of the analog years

Exhibit 11. Most Active Years Are Analogs For 2016 Forecast

MAXIMUM ACTIVITY

TROPICAL STORMS[1]		HURRICANES		MAJOR HURRICANES	
Number	Years	Number	Years	Number	Years
28	2005	15	2005	8	1950
21	1933	12	1969,2010	7	1961, 2005
19	1887,1995,2010	11	1887,1950,1995	6	1926,1955,1964,
18	1969	10	1870,1878,1886,		1996,2004
16	1936,2003,2008		1893,1916,1933,	5	1893,1916,1933,
15	1916,2000,2001		1998		1951,1958,1969,
	2004, 2007	9	1880,1955,1980,		1995,1999,2008,
14	1953,1990,1998		1996,2001,2004		2010

MINIMUM ACTIVITY*

TROPICAL STORMS[1]		HURRICANES		MAJOR HURRICANES	
Number	Years	Number	Years	Number	Years
1	1914	0	1907,1914	0	In 31 years
3	1930	1	1905,1925		last in 1994
4	1857,1868,1883,	2	1890,1895,1917,	1	In 48 years
	1884,1890,1917,		1919,1930		last in 1997
	1925,1983		1931,1982		
5	In 18 years	3	In 30 years		
	last in 1962		last in 2009		

Notes

[1] Includes subtropical storms after 1967.

*likely underestimated before satellite imagery in 1966

Source: NHC

Exhibit 12. Record Of U.S. Hurricane Landfalls

	Category					ALL	Major
DECADE	1	2	3	4	5	1,2,3,4,5	3,4,5
1851-1860	7	5	5	1	0	18	6
1861-1870	8	6	1	0	0	15	1
1871-1880	7	6	7	0	0	20	7
1881-1890	8	9	4	1	0	22	5
1891-1900	8	5	5	3	0	21	8
1901-1910	10	4	4	0	0	18	4
1911-1920	8	5	4	3	0	20	7
1921-1930	8	2	3	2	0	15	5
1931-1940	4	7	6	1	1	19	8
1941-1950	8	6	9	1	0	24	10
1951-1960	8	1	6	3	0	18	9
1961-1970	3	5	4	1	1	14	6
1971-1980	6	2	4	0	0	12	4
1981-1990	9	2	3	1	0	15	4
1991-2000	3	6	4	0	1	14	5
2001-2010	8	4	6	1	0	19	7
1851-2010	113	75	75	18	3	284	96
Average per decade	7.1	4.7	4.7	1.1	0.2	17.8	6.0

Note: Only the highest category to affect the U.S. is used

Source: NHC

Their forecast could be biased upward

selected by *StormGeo* listed. That suggests to us that their forecast could be biased upward. On the other hand, it may be safer to forecast higher activity given the changing nature of the meteorological conditions impacting the Atlantic basin this season.

Which of those factors will become the dominant force impacting storm formation, strengthening and movement?

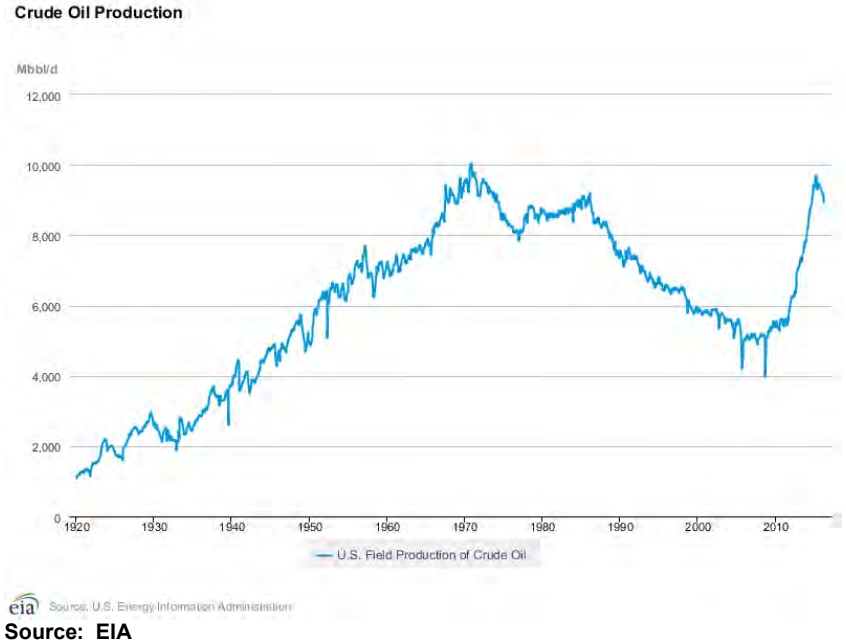
Exhibit 13. Year With Greatest Impact On GoM Oil And Gas

Source: NHC

What the oil and gas industry and residents of the Gulf Coast fear is a repeat of 2005 when the region was devastated by a number of major hurricanes

What the oil and gas industry and residents of the Gulf Coast fear is a repeat of 2005 when the region was devastated by a number of major hurricanes including Katrina, Rita and Dennis. It took years for both the oil and gas industry and people living along the Gulf Coast to recover – and in some cases that recovery is still incomplete. For the oil industry, Exhibit 14 shows the impact when the hurricanes of 2005 hit production. There was a similar impact in 2008 with Hurricane Gustav. The impact is shown by the sharp

Exhibit 14. Production Spikes Down Show Hurricane Impact



Source: EIA

Hurricanes, whether they reach land or not, cause production problems for the oil and gas industry

downward spikes in the U.S. crude oil production chart. Downward production spikes in earlier years were not as large as in 2005 and 2008, but they did occur. Had we posted a chart of natural gas production and the impact from hurricanes, there would have been similar downward spikes and more frequent ones as the Gulf of Mexico has largely become a natural gas basin. The point is that hurricanes, whether they reach land or not, cause production problems for the oil and gas industry. The magnitude and duration of these impacts depends both on the intensity of the storm, its physical size and its speed. None of these variables can be predicted in advance.

We could experience a rude ending to our long hurricane hiatus

According to *StormGeo*, it expects 3-4 tropical storms in August, 5-6 in September, 1-2 in October and possibly one in November. We suggest people keep an eye on the tropical disturbances that form in the Atlantic basin and in the tropics this season as we could experience a rude ending to our long hurricane hiatus.

Nuclear Power And The Utility Market Challenge

The challenge for electric company executives was figuring out how to add new generating capacity at the proper pace to match the projected demand growth

At one point not that many years ago, the dream for many corporate executives was to be reincarnated as a 1950s electric utility company executive. They desired to be reincarnated because during the 1950s electricity consumption grew steadily in lockstep with economic and population growth. This was also an era when consumers bought more appliances that were powered by electricity. Moreover, there were no alternatives for residents other than generating their own power. The challenge for electric company executives was figuring out how to add new generating capacity at the proper pace to match the projected demand growth. That strategy insured that a company's rate base – its total assets – grew over time as this was the key to rising earnings and increasing dividends for shareholders. With low and stable long-term interest rates, financing new generating, transmission and distribution assets was easy. As a result, the most important role for electricity company CEOs was the "care and feeding" of public utility commissioners in order to make sure that they granted periodic increases to the allowed rate of return on the asset base. That process insured the increases in earnings and dividend growth. Luncheons and golf games were an important responsibility of utility CEOs!

This new reality is hitting home for operators of fossil fuel-fired power plants and nuclear plants, in particular

The reincarnation wish is offered as a joke by stressed-out executives who have to deal with subpar economic growth, geopolitical challenges, extraordinarily low interest rates, volatile and unusually low commodity prices, climate change pressures, activist shareholders, and mandates for increased use of interruptible power sources that complicate operating electricity grids. This new reality is hitting home for operators of fossil fuel-fired power plants and nuclear plants, in particular.

Nuclear power plants currently provide nearly 60% of carbon-free energy in this country

Nuclear power plants currently provide nearly 60% of carbon-free energy in this country, or over three times the amount of clean energy provided by hydroelectric plants. This is an important consideration as the battle over increased use of carbon-less energy is taking center stage not only in the United States but particularly in Europe and elsewhere. The primary sources of carbon-less energy investment are wind and solar. They are being promoted as the ideal, and in many cases the only sources of clean energy, by proponents of climate change. They see these two clean energy sources as the salvation for the planet's ecology.

They are now promoting nuclear power as an important component of the solution for a carbon-free energy system

Climate change realists appear to have realized that there is virtually no way in which the world shifts its fixed power needs to wind and solar despite the various academic studies produced showing that the global economy can be powered solely by these energy sources. Some environmentalists not only are recognizing the role that carbon-free nuclear power may have to play in improving the planet's climate, they are now promoting nuclear power as an important component of the solution for a carbon-free energy system. Other environmentalists, however, see nuclear power as just another fossil fuel since the energy fuel – uranium – is mined just like all other fossil fuels. These critics also point to the potential danger of nuclear power based on the two historical nuclear power plant accidents – Three Mile Island in 1979 and Chernobyl in 1986, although in the case of the former there was no radiation released while the latter demonstrated the weakness in certain atomic power plant designs.

Based on what has happened to the nuclear power industry since the late 1980s, one has to wonder what would have happened to the global energy business had these accidents not occurred? In fact, in an article in *The Atlantic* magazine, these accidents were offered as an answer to the question: What accident most changed the course of history?

In the United States, the push for nuclear power was partially driven by the shortage of natural gas that emerged at the end of the 1960s and the early years of the 1970s

In the United States, the push for nuclear power was partially driven by the shortage of natural gas that emerged at the end of the 1960s and the early years of the 1970s. At that time, the problem for natural gas was that supplies destined for the Northeast, Midwest, Middle Atlantic and West Coast regions of the country were under very strict, and low, price regulation by federal regulators. The price of interstate natural gas was regulated by "rate-of-return" economics that depressed the price and made exploring for and producing gas to supply these markets considerably less attractive than providing gas to industrial users within select states – the intrastate market. During the mid-to-late 1970s, the intrastate markets of Texas and Louisiana offered local natural gas suppliers prices in the $7-$8 per thousand cubic feet (mcf) of gas range at a time when the interstate gas price was $0.75/mcf, having recently been raised from $0.50/mcf.

There were a number of planned nuclear power plants that were cancelled after the accident and replaced by plants fueled by coal, petroleum and natural gas

Had there been no Three Mile Island accident, nuclear power would have provided a much greater share of the nation's electricity consumption, leaving natural gas to languish. There were a number of planned nuclear power plants that were cancelled after the accident and replaced by plants fueled by coal, petroleum and natural gas. Yes, there would still have been pressure to raise the interstate gas price to attract greater supplies for the residential heating market around the country, but other changes to the power market and gas market would have been different. For example, there might have been less pressure to force the amalgamation of the intrastate and interstate gas markets as ultimately evolved in an attempt to bolster supplies for the interstate markets. There also might never have been bans on burning gas under industrial boilers as actually occurred, which ultimately contributed to the extended period of depressed natural gas prices in the 1990s. The point is that without Three Mile Island, our nuclear power, natural gas and coal industries would have developed much differently than they did, leaving the U.S. electricity market in a potentially very different state than it is today. It is also likely that our atmosphere might contain less CO2, although that might not have avoided the global warming we are currently experiencing due to the planet being in an interglacial period when natural warming always occurs.

The issue is that over their very long lives, these nuclear plants require extensive and costly periodic upgrades and repairs

Many of the nuclear power plants that were built in the 1960s and 1970s are now approaching the end of their commercial lives. The challenge is that nuclear power plants have the potential for very long operating lives, often on the order of 80 years, meaning that those older plants might have an additional 20 or 30 years of operating life remaining. The issue is that over their very long lives, these nuclear plants require extensive and costly periodic upgrades and repairs. In order to finance these modifications, the plants must generate significant profits during their operating lives. Low coal and now low natural gas prices have undercut the price of nuclear power, often making these plants the highest cost fossil fuel plants in utility company portfolios. These economic challenges ignore the fact that nuclear power plants have the highest operating ratios of all power plants, meaning that they produce power when people need it and that the power output is carbon-free.

In recent years is that there has been a rise in greenhouse gas emissions every time nuclear power plants are closed

The nuclear power economics is now forcing various states to deal with the impact of the potential loss of the plants' output. What has happened in recent years is that there has been a rise in greenhouse gas emissions every time nuclear power plants are closed. The most recent examples of this phenomenon are California and New England when the San Onofre and Vermont Yankee nuclear plants were closed. We can also point to this problem existing in Germany, too. The German government moved to close the country's nuclear power plants following the 50-foot tsunami following an earthquake that damaged Japan's Fukushima nuclear plant in 2011. Germany quickly moved to replace the electricity produced by its nuclear power plants with power supplied

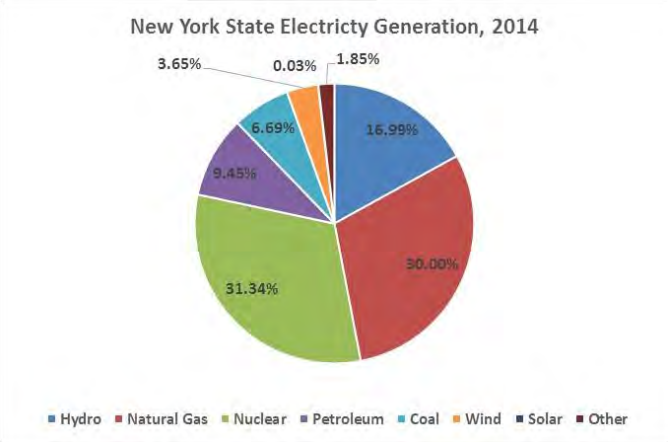
The bottom line of these moves in Germany, California and New England is that power costs are higher and their atmospheres are dirtier

from new wind and solar facilities. Due to the intermittency issues of wind and solar power, German utilities have been forced to step up their use of American coal to supplement domestic lignite supplies to fire power plants to meet the nation's electricity demand with the side-effect of significantly increased carbon emissions. The bottom line of these moves in Germany, California and New England is that power costs are higher and their atmospheres are dirtier.

Nuclear power is the largest component of the state's power supply at over 31%, while natural gas is second at 30%

One of the more interesting situations for the nuclear power business is the State of New York. Governor Andrew Cuomo (Dem) has been championing a policy that calls for half the state's electricity to come from renewable sources such as wind, solar or nuclear power by 2030. Exhibit 15 shows the composition of the state's electricity generation during 2014 (the latest data available from the Energy Information Administration web site). It is important to note that nuclear power is the largest component of the state's power supply at over 31%, while natural gas is second at 30%. Hydroelectric, another clean energy source, supplied the state with 17% of its electricity. Combined, coal and petroleum accounted for over 16% of the state's power. Note that solar power was negligible and wind provided only 3.6% of the state's electricity.

Exhibit 15. NY Power Mostly From Nuclear And Nat Gas

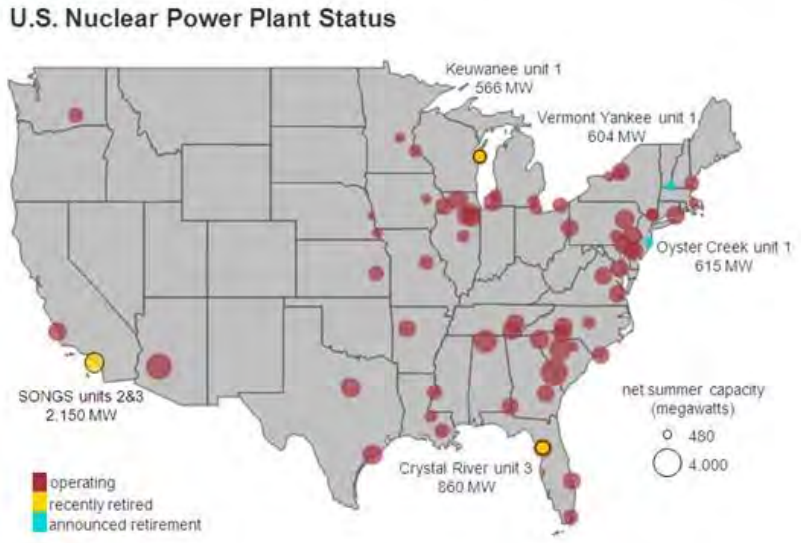


Source: EIA, PPHB

In order for Gov. Cuomo's plan to work, he needs both an aggressive program of building new wind and solar facilities as well as keeping the hydroelectric and nuclear power plants operating

In order for Gov. Cuomo's plan to work, he needs both an aggressive program of building new wind and solar facilities as well as keeping the hydroelectric and nuclear power plants operating. The state has three nuclear power plants located upstate – one near Syracuse and two on Lake Ontario - and one plant located downstate along the Hudson River in Westchester County. Gov. Cuomo has been lobbying for a long time for shutting down the Indian Point plant in Westchester County, arguing that a nuclear power plant should not be located in such a large metropolitan area. So far, the plant's owner, Entergy (ETR-NYSE), has successfully opposed those efforts.

Exhibit 16. NY Nuclear Plants At Opposite Ends Of State



Source: www.thedailysheeple.com

The state has determined that if the nuclear power plants were shut, local utilities would have to rely on power from power plants fueled by dirty gas and coal

Low natural gas prices have seriously undercut the power prices for the nuclear power plants upstate, to the point that the owners – Exelon (EXC-NYSE) and Entergy – have threatened to shut down the plants. If that were to happen, New York State's plan to have half its power coming from clean energy sources by 2030 would be doomed. In fact, the state has determined that if the nuclear power plants were shut, local utilities would have to rely on power from power plants fueled by dirty gas and coal. That would detract from the governor's clean energy goal. That goal is why Gov. Cuomo has fought the use of hydraulic fracturing in the state to tap greater supplies of locally produced natural gas. Natural gas, although cheaper than the governor's favored three sources of clean energy, would have released more greenhouse gases, but it is likely that the cost to consumers would have been less than what will happen in the future. Gov. Cuomo has championed a plan that was embraced by New York's Public Service Commission and will force utility customers in the state to pay nearly $500 million a year in subsidies designed to keep the three upstate nuclear power plants operating. The Indian Point plant will not receive any subsidy funds because downstate power prices are sufficiently high that the plant can earn a profit.

The overall cost of the clean energy program to utility customers would be less than $2 a month, according to the Public Service Commission

According to the Public Service Commission, starting in 2017, the subsidies will cost utility ratepayers in New York State $962 million over two years. However, the overall cost of the clean energy program to utility customers would be less than $2 a month, according to the Public Service Commission. The chairman of the commission said that state officials had calculated the social and economic benefits of the program, including the reduction of carbon emissions, lower prices for electricity and more jobs in the electricity

Environmental groups are fighting back

generation business, and that these benefits would be greater than the cost of the subsidies. Environmental groups are fighting back, claiming that while they supported the governor's plan to mandate the purchase of renewable energy by utilities, they viewed the magnitude of the subsidies that could amount to several billion dollars over the 12 years to 2030 as a mistake. Exelon, the owner of two of the three up-state nuclear power plants applauded the Public Service Commission announcement and pledged to invest $200 million in the plants next year if the plan is approved.

As Mr. Shellenberger put it, "from the whole life-cycle analysis, it's just better"

Environmentalists who are serious about clean energy should pay attention to the comments of Michael Shellenberger, the president of nonprofit research and policy organization Environmental Progress. He said that nuclear power plants produce so much more energy than other forms that they can be more environmentally friendly than even renewables when all the mining, development and land disturbances are taken into account. As Mr. Shellenberger put it, "from the whole life-cycle analysis, it's just better." Of course, on the other side of the issue is someone such as Abraham Scarr, director of the Illinois Public Interest Research Group, a consumer advocate group, who said, "We should be building the 21st century energy system and not continuing to subsidize the energy system of the past."

The issue is how to deal with the current low prices for coal-fired and natural gas-fired power that is undercutting nuclear power

Increasingly, we are seeing environmental activists who are seriously examining the case for a clean energy system that is exclusively based on wind and solar and concluding that it will only work if nuclear power plays a major role. The issue is how to deal with the current low prices for coal-fired and natural gas-fired power that is undercutting nuclear power. Maybe subsidies for nuclear power are the answer. It will be interesting to see if New Yorkers are willing to lead the energy revolution.

Brief Comments And Observations On Recent Topics

Autonomous Vehicles

Mr. Musk expects the autopilot technology to enter and overtake the new vehicle market much faster than most other observers

Elon Musk, the CEO of Tesla (TSLA-OTC), talked about how quickly he expects autonomous vehicle technology to enter the automobile market. In his view, this technology is a "no brainer" and easily mastered, even though his company has multiple explanations for what caused the deadly crash of one of its vehicles operating in autopilot mode. Mr. Musk expects the autopilot technology to enter and overtake the new vehicle market much faster than most other observers.

On the other hand, an article in *The Wall Street Journal* discussed how long it took for autonomous technology to penetrate the air transportation industry. Today's modern airplanes can take-off, fly and land without relying on the pilots. We remember flying on a

KLM flight in 1976 between Houston and Amsterdam that made a scheduled stop in Montreal and having the pilot announce that it was the first time a KLM plane had made a landing completely under the control of the autopilot. Reportedly, the only thing planes cannot do on their own is taxi and park at the gate. That fact conjured up the phrase "wake me when it's over."

Maybe the government needs to start figuring out what to do with all the unemployed automobile insurance workers

Another article we read discussed what would happen to the automobile insurance business when autonomous/accident-free vehicles took over the industry. We guess that lower insurance payments would help fund the higher cost of vehicles with autonomous controls since they will need expensive sensors. Maybe the government needs to start figuring out what to do with all the unemployed automobile insurance workers.

Economic Growth

Bank interest rates were lowered to 0.25 percent, the lowest rate in its 322-year history

Last week the Bank of England cut interest rates in an attempt to head-off what it expects will be substantially weaker economic conditions due to the nation's Brexit vote. Bank interest rates were lowered to 0.25 percent, the lowest rate in its 322-year history. The Bank of England signaled that it would begin buying corporate debt issues in order to inject cash into the British economy and reduce interest rates as it lowered its economic growth forecast for 2017 and 2018 from 2.3% to 0.8% and 1.8%, respectively. The Bank's announcement signaled that Britain would become another major economy to move into the world of negative interest rates.

Our bigger concern is what the Bank of England's new economic outlook suggests for other European economies next year

While one article we read suggested that negative interest rates should be viewed as insurance to protect the value of investments, we remain old-school and believe that one is entitled to a return on his investments rather than just a return of investments minus some "insurance payment." Our bigger concern is what the Bank of England's new economic outlook suggests for other European economies next year. Further ratchetting down of economic growth forecasts cannot be good for the recovery in energy markets and crude oil prices.

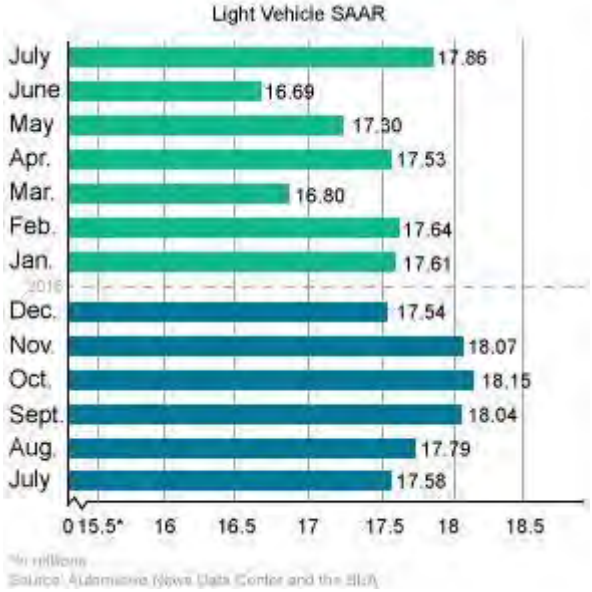
Fuel-efficiency Ratings

The government and auto companies are just starting to negotiate the final phase of these fuel-efficiency targets

With the latest projection that the average fleet fuel-efficiency in 2025 will fall as much as four miles per gallon (mpg) short of the previously agreed-to goal of 54.5 mpg. The government and auto companies are just starting to negotiate the final phase of these fuel-efficiency targets with the industry lobbying for a delay or modification of the target.

These negotiations are being held with an industry backdrop of a possible peaking in domestic auto sales. The July auto sales figures put the seasonally-adjusted annual sales volume at 17.86 million

Exhibit 17. Auto Sales Are Beginning To Weaken



Source: ***Automotive News***

If auto sales have peaked following six years of consistently higher sales figures, one of the supports for energy demand will be lost

units, up 0.5%. There was much greater disparity in performance among the various companies. The bottom line is that the modest July sales gain came as a result of higher sales incentives, more leasing deals and continued cheap financing packages. If auto sales have peaked following six years of consistently higher sales figures, one of the supports for energy demand will be lost. A weak auto sector is not a positive indicator for the health of the U.S. economy and would support the various economic growth forecast reductions.

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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