
MUSINGS FROM THE OIL PATCH

June 24, 2014

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

In A World Of Oil Terrorism, Natural Gas Storage Is Crucial

How much more production can come from these suppliers?

The past few weeks have changed the dynamics driving the global crude oil market. For most of the past couple of years, a principle reason why global oil prices have been elevated is that oil production disruptions, primarily in the Middle East and Africa, have kept a significant volume of supply off the market, putting undo stress on the remainder of the oil producing community to lift its output to meet the shortage. Whether it was Nigeria, Libya or Iran, the lost oil output was offset by increased production from Saudi Arabia, Iraq and, surprisingly, the United States. How much more production can come from these suppliers, or are we condemned to facing an energy future dictated by the level of global conflict that disrupts oil output?

The heightened civil war has increased the fear that the caliphate will overrun the remainder of the country including its primary oil producing region in the south

In the past few weeks, the ongoing civil violence in Iraq has exploded into an all-out civil war, as a faction of al-Qaida, the Islamic State of Iraq and al-Sham (ISIS), has moved to overthrow the elected Iraqi government in Baghdad in order to establish a new caliphate covering territory encompassing parts of Syria and Iraq where Sunnis dominate the population. This new caliphate has already engulfed a few of Iraq's producing oil fields, but the heightened civil war has increased the fear that the caliphate will overrun the remainder of the country including its primary oil producing region in the south, except for the northern Kurdistan region. The Kurds are working to break away from Iraq in order to establish a separate nation, and to boost their oil output and exports to the west. As the terrorists have advanced from the north to the south of Iraq, they are threatening the continued production of Iraq's over 2.5 million barrels a day of crude oil output in the south. Potentially of greater concern for global oil markets, is the possible long-term disruption of Iraq's plan to boost its oil output to nine million barrels a day. The escalation of the civil war has forced

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western oil companies and service contractors working in Iraq to move their workers out of the country. Until peace is re-established and the sanctity of the oil company contracts can be assured, the industry will be reluctant to return to Iraq to resume activity, eliminating any hope of the country's oil output rising. In fact, without production maintenance activities, output is likely to drop.

The prospect of less oil in the future, even though the reality and timing of any increase has always been in question, means the world oil supply/demand balance will remain tight for the foreseeable future, which will sustain high oil prices, or even drive them higher. Under that scenario, oil prices are going to be meaningfully higher for a longer time period than were ever anticipated by the low oil price optimists. Energy analysts suggest that due to the Iraqi turmoil, global crude oil prices are likely headed higher by anywhere from \$20 to \$85 dollars per barrel, which would put Brent in the \$135 to \$200 per barrel range. The low end of that potential increase could probably be absorbed by global economies with only a modest loss of annual growth. On the other hand, the top end of the price-rise range probably signals a global recession, potentially as severe as we experienced in 2008-2009. For the oil business the last recession was devastating.

A global recession caused by a spike in world oil prices would hurt all economies, but some would fare better than others. The issue would become just how high the spike in oil prices would go, how long it might last, in addition to how quickly the better-positioned countries are able to adjust to the higher prices. The answer to the first two questions depends on whether the ISIS group seizes the key oil producing fields in southern Iraq and removes them from the world market. This could quickly become a repeat of the 1978 Iranian revolution that took four million barrels of oil off the market and caused global oil prices to double. The answer to the third question depends on whether oil use can be replaced with other fuels. For the United States, our diversified energy supply mix, with natural gas playing an important and growing role should mitigate the economic pain from sharply higher oil prices. The challenge for America is that natural gas and coal, our main fuel alternatives, have limited use in the transportation sector – at least in the short-term. Natural gas marginally could play a role in reducing our transportation-related needs as Flex-fuel-equipped vehicles could shift to using liquefied natural gas (LNG). Likewise, more vehicles powered by compressed natural gas (CNG) could be built. Certainly, vehicles and machinery could be built to be powered by electricity that could be produced from coal and natural gas or even run directly by some form of natural gas.

While it may not appear that the Iraq civil war and spiking global oil prices are linked to rebuilding domestic natural gas storage volumes, our view is that the inability of the petroleum industry to rebuild storage this summer would create fear among consumers about

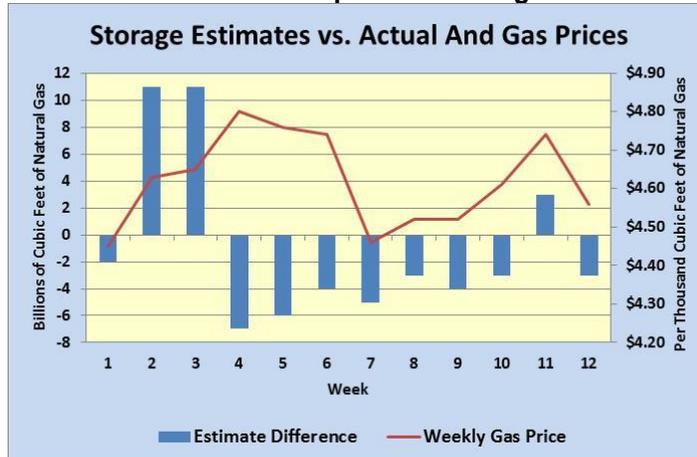
What is the potential that the industry can rebuild gas storage this summer and regain some of that lost respect?

Some analysts were now beginning to think the industry is capable of reaching 3.2 Tcf or even possibly 3.4 Tcf of gas in storage by the end of the injection season

winter gas price spikes and could push our politicians to meddle in the industry's operations out of concern that energy companies were incapable of solving the nation's energy dilemma. Demonstrating its competence by rebuilding gas storage volumes would, in our view, go a long way to helping the petroleum industry regain some of the stature it has lost in recent years. What is the potential that the industry can rebuild gas storage this summer and regain some of that lost respect? Understand that this will not make people love the industry – we are well beyond that point.

In the last issue of the *Musings*, we discussed our view that because the industry has finally gotten its weekly gas injection rate up above last year's performance, prospects for our estimate had been enhanced. That forecast had the industry injecting at least 2.2 billion cubic feet (Bcf) of gas into storage, bringing total available storage volumes at the start of the withdrawal season on November 1st to 3.0 trillion cubic feet (Tcf) – a level that should be sufficient to ease the concerns of gas users. We also said that some analysts were beginning to think the industry is capable of reaching 3.2 Tcf or even possibly 3.4 Tcf of gas in storage by the end of the injection season. With the Atlantic hurricane season underway and the Energy Information Administration (EIA) now predicting that based on the hurricane forecast of the National Oceanic and Atmospheric Administration (NOAA), the petroleum industry is likely to experience more storm days than last year that could limit production. This concern could be mitigated if a stronger El Niño develops in the South Pacific Ocean this summer that has the power to generate atmospheric conditions that limit development of Atlantic basin hurricanes and weaken any storms that actually do form.

Exhibit 1. Gas Prices Respond To Storage vs Forecast



Source: EIA, PPHB

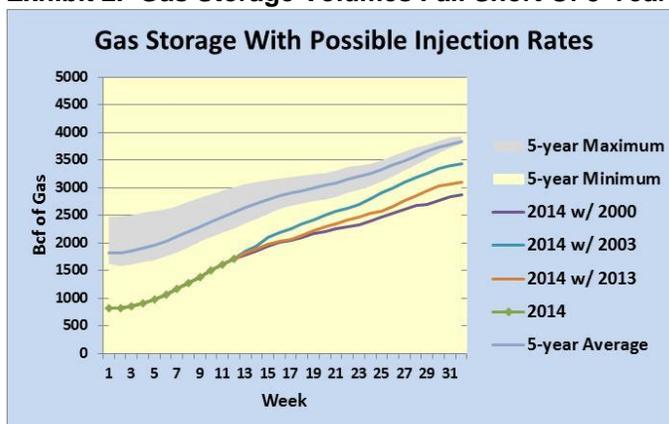
As often happens when the petroleum industry concentrates on a specific trend, the investment community and commodity traders become overly concerned with how weekly results compared to the

As violence in the Middle East escalated and economic statistics showed a strengthening U.S. economy, natural gas prices started to climb

forecasts made by analysts. We now have analysts guessing what the weekly gas injection volume will be and following the announcement, natural gas prices move based on whether actual results meet, exceed or fall short of the analysts' estimate. This phenomenon is displayed in Exhibit 1 (prior page) that tracks the weekly gas price movement following the injection announcement.

As Exhibit 1 shows, in the first couple of weeks of the injection season, actual injection volumes fell below the estimates, and in response, natural gas prices rose. Starting in the fourth week and continuing until the June 12th injection report (week 11) when the reported injection volume was below the estimate, gas injections outperformed estimates causing natural gas prices to fall. As violence in the Middle East escalated and statistics showed a strengthening U.S. economy, natural gas prices started climbing. They jumped higher after injection volumes fell below analysts' estimates, but then fell after last week's injection beat forecasts.

Exhibit 2. Gas Storage Volumes Fall Short Of 5-Year Range



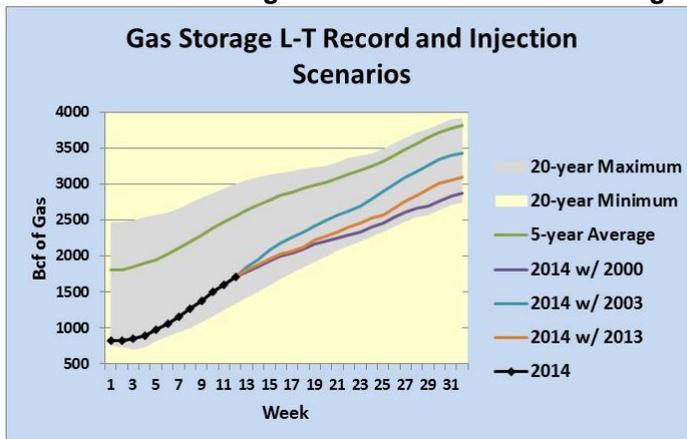
Source: EIA, PPHB

The current industry replenishment rate is doing better when compared with the long-term history versus the more recent short-term history

We thought it would be helpful to look at what volume the withdrawal season might start with if the remainder of the 2014 injection season follows either the weakest injection season (2000) or the strongest (2003). We also examined how the storage volume might grow if the 2014 injection season merely followed last year's pattern. To understand where these scenarios might put the 2014 season in relation to the past, we plotted the forecasts against the average of the minimum and maximum storage volumes each week over the past five years and over the past 20 years. It is easy to see that the current industry replenishment rate is doing better when compared with the long-term history versus the more recent short-term history.

While 2000's injection season started with slightly more than 300 Bcf of gas in storage than this year, the season ended at less than 2,800 Bcf, meaning the industry was only able to inject 1,595 Bcf of gas during the summer. Only 2012 saw less gas injected than in 2000,

Exhibit 3. Gas Storage To Be Within Historical Range

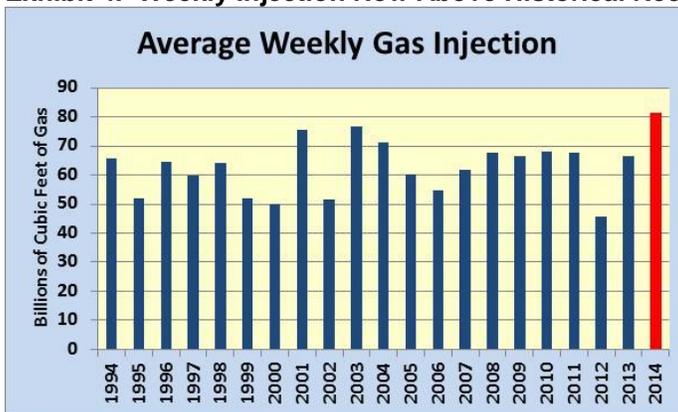


Source: EIA, PPHB

The 2003 injection season began with storage of about 125 Bcf below this year’s starting volume of 822 Bcf, but wound up the summer with storage at 3,155 Bcf

which was marked by the industry beginning the injection season with 2,472 Bcf of gas in storage, and ending it with 3,929 Bcf, the greatest volume in storage ever since 1994. In contrast, the 2003 injection season began with storage of about 125 Bcf below this year’s starting volume of 822 Bcf, but wound up the summer with storage at 3,155 Bcf, reflecting a total injection volume of 2,495 Bcf. That was the most gas injected in any year since 1994, slightly exceeding the 2,414 Bcf of gas injected in 2001.

Exhibit 4. Weekly Injection Now Above Historical Record



Source: EIA, PPHB

Based on the weekly storage volumes so far this year, the industry is averaging 81.5 Bcf of gas per week being injected

Last year, the industry began the injection season with 1,687 Bcf of gas in storage. After injecting 2,127 Bcf of gas, the injection season ended with a storage volume of 3,814 Bcf. Based on the weekly storage volumes so far this year, the industry is averaging 81.5 Bcf of gas per week being injected, which is well above the low season average of 58 Bcf per week of 2000, but modestly below the high volume of 87 Bcf per week injected during the 2003 season. Last year, the industry averaged 70 Bcf of gas injection weekly. With the industry outperforming the seasonal averages of last year

When looked at over 1994-2014, all three scenarios put the industry storage volumes within the minimum-maximum range

With an 81.5 Bcf per week average storage injection, if that pace is maintained for the rest of the season, the industry would reach a volume slightly above 3.4 Tcf by November 1

and the weakest injection season, hopes are high that the industry will reach a storage volume that will ease the price spike concerns of gas users.

If the industry injection volumes track those of the three years we modeled, only the weakest historical injection season would leave storage volumes below 3.0 Tcf, but none of these scenarios would put storage volumes within the range of the minimum and maximum volumes of the past five years. When looked at over 1994-2014, all three scenarios put the industry storage volumes within the minimum-maximum range, with the high injection volume (2003) pattern putting it in the upper half of the range. An injection season averaging the same as last year would put the final volume in the bottom third of the historical range. Only the weakest injection season (2000) would put the final volume near the absolute minimum of historical storage volumes.

To appreciate the task in front of the gas industry, Exhibit 5 shows where we started and where we are in rebuilding storage volumes as of June 19. To reach 3.4 Tcf of gas in storage, the industry needs to inject 1,681 Bcf of gas before the end of October. With an 81.5 Bcf per week average storage injection, if that pace is maintained for the rest of the season, the industry would reach a volume slightly above 3.4 Tcf by November 1. We still have several months of hot weather potentially ahead along with possible production disruptions due to hurricanes. Those issues will impact weekly injections, as will other factors such as the performance of nuclear power plants and switching between gas and coal.

Exhibit 5. The Hole Gas Industry Climbing Out Of



Source: EIA, PPHB

In our view, barring some unforeseen production disaster, we would rule out the industry only matching the weakest historical injection season. Therefore, the question becomes whether the industry can match the best injection season ever, or only exceed the performance of last year. It may still be too early to make that call,

We don't believe the industry will reach 3.4 Tcf as we sense there are too many variables that could work against gas during the balance of the injection season

but we are confident the industry will wind up averaging more than last year but less than the historical best year. Thus, we are now thinking that the industry will wind up with storage reaching 3.2 Tcf, with the outside possibility that it will reach 3.3 Tcf. We don't believe the industry will reach 3.4 Tcf as we sense there are too many variables that could work against gas during the balance of the injection season. If the industry hits our estimate, or those of other gas storage optimists, we would expect natural gas prices to remain in the \$4.50-\$4.75 per thousand cubic feet range. You can expect us to revisit this forecast several times before the start of the withdrawal season because gas prices will be an important influencing factor on the domestic economy's outlook and the future of oilfield activity and the petroleum industry's performance.

Compressed Natural Gas Vehicle Economics Are Challenged

Another challenge is finding a fueling station unless you are fortunate enough to work at a location with refueling capabilities, or you have access to a pump in your own garage

A few weeks ago, the Natural Gas Vehicle USA Conference was held in Houston, at which time the status of the industry and its great promise was discussed in the context of the economic challenge facing the fuel's acceptance in the transportation business. There are a handful of vehicles in Houston powered by compressed natural gas (CNG). Their owners, many of whom are affiliated with the natural gas or energy industries, talk about the benefits of their cars. However, they are often forced to acknowledge the challenges that come with owning a CNG vehicle, which includes the loss of significant storage space in the vehicle due to the need for a large fuel tank. Another challenge is finding a fueling station unless you are fortunate enough to work at a location with refueling capabilities, or you have access to a pump in your own garage.

The effort falls into the chicken-and-egg problem – to get more CNG-equipped vehicles there needs to be more CNG refueling stations

Proponents of increased use of natural gas, primarily in the form of CNG, have targeted the over-the-road trucking industry as the most logical adopter. Plans are to build CNG refueling stations along the interstate highway network to supplement local refueling stations, but this effort is slow in progressing. The effort falls into the chicken-and-egg problem – to get more CNG-equipped vehicles there needs to be more CNG refueling stations, but they are guaranteed to be lonely outposts until there are more CNG vehicles in the fleet. Who moves first?

His company's trucks are getting about 9% less fuel-economy using natural gas than it initially expected when it calculated whether or not to invest in CNG technology

It was somewhat disconcerting to hear about the economic challenges from CNG fleet operators. In an interview, Bill Bliem, senior vice president of fleet services at NFI Industries, a New Jersey-based logistics company was quoted as saying, "Right now, we're doing it solely for sustainability. We're not saving any money. I'm glad to hear we're not the only one to struggle with fuel mileage." He was referencing the fact his company's trucks are getting about 9% less fuel-economy using natural gas than it initially expected when it calculated whether or not to invest in CNG technology. We guess that had management known about this discrepancy in fuel

In addition to the significant station cost, a CNG-equipped truck will cost 50% to 80% more than a gasoline-powered equivalent unit

performance it might have elected to wait for someone else to test the technology and prove up the economics.

Part of the economic problem is that in order to construct a refueling station that competes time-wise with a gasoline station in refueling, the cost is between \$700,000 and \$1 million. A slow refueling station's cost is about \$300,000, but this is not a real option for commercial operations unless their vehicles can function with overnight refueling. Operators desire to own their own fueling stations to avoid paying the mark-up in buying the fuel. In addition to the significant station cost, a CNG-equipped truck will cost 50% to 80% more than a gasoline-powered equivalent unit, adding to the economic decision hurdle. For trucks, there is the additional factor of the reduced carrying capacity due to the large fuel supply tanks needed, meaning that revenue may be hurt. A final consideration is that there are only about 1,400 CNG refueling stations nationwide versus 157,000 gasoline and diesel outlets, adding to the question of refueling flexibility.

There is the additional potential risk to CNG economics that would come should natural gas prices jump higher

The goal of introducing natural gas into the nation's transportation fuel supply mix is a desirable one because it has fewer carbon emissions and enjoys a low price due to the current bountiful gas supply situation. The problem is that the economics of operating CNG-powered trucks still represent a formidable hurdle that companies need to get over in order to justify the necessary investment. As Mr. Bliem pointed out in his interview, his company only has a few CNG-equipped units (30 out of 1,000), but in California where they operate, the trucks are not attaining sufficient mileage to begin to justify the unit's additional cost. We expect CNG-powered vehicles will gain some market share in the transportation sector, but probably not as much as its proponents are hoping. There is the additional potential risk to CNG economics that would come should natural gas prices jump higher, which would erode the current advantage that cheap natural gas has over higher-priced gasoline and diesel fuel. Stay tuned – the economics and technology of CNG within the transportation sector is not settled.

The Impact Of Rig Efficiency On Drilling And Production

Producers, drillers and rig equipment companies have learned that hardware changes can improve drilling efficiency, and in turn, the exploration and development economics of shale plays

The American shale revolution has changed the nature of the domestic oil and gas business in many ways. One of those changes is the embrace of pad drilling as the method for achieving more efficient drilling while minimizing the environmental impact from petroleum activity. This damage is a contributing factor to the public's growing objection to shale development in various communities around the nation, and, in particular, in several promising shale basins. The shift to more pad drilling has changed how players seek to adjust. Producers, drillers and rig equipment companies have learned that hardware changes can improve drilling efficiency, and in turn, the exploration and development economics of shale plays.

There was a time when the most prized capability of drilling rigs, besides how deep a well they could drill, was their speed in moving between drilling locations

There was a time when the most prized capability of drilling rigs, besides how deep a well they could drill, was their speed in moving between drilling locations. Rigs that could be disassembled and reassembled quickly and were packaged in unit sizes that easily fit on and maximized the carrying capacity of trucks were able to achieve higher utilization that contributed to better profit margins for their owners. The capability for moving has lost its value for customers as they have embraced pad drilling. According to one oil company, speaking at a recent Society of Petroleum Engineers drilling automation conference, by utilizing pads for drilling, rig movement now represents only 4% of total rig time versus 25-30% of rig time in the prior drilling environment. Given the change in the value of moving time, improvements in drilling rigs that reduce the drilling time and/or increase the drilling capacity of a rig is much more desirable than the time lost by the rig being less mobile or less compact for moving.

Embracing pad drilling has as an objective, the pulling of lower-quartile performing rigs up closer to those rigs in the top quartile of performance

At the drilling automation conference there were some interesting discussions of what producers want from modern drilling rigs and how equipment and operational changes made in recent vintage rigs have influenced their efficiency, and thus the cost of drilling shale wells. One drilling contractor stated that 80% of wells in major shale basins are now being drilled from pads. Embracing pad drilling has as an objective, the pulling of lower-quartile performing rigs up closer to those rigs in the top quartile of performance. An official of a shale producer commented that one aspect of drilling efficiency, besides reducing the time required to drill wells, was to increase their standardization such that every well becomes the best well the company ever drilled in the basin. This representative began his presentation by saying that in the past, if you asked a producer about the best well he had drilled in a field, he would give you a low number of days. But the reality is that had you asked him to give you the history of the days needed to drill all the wells in that field, you would find that the days-per-well number would jump all around with only a few wells being the best or close to the best well drilled. He referred to this phenomenon as selective memory failure because producers always focus on their best well and not their average well or the variability of drilling performance. What producers are really trying to accomplish in their focus on rig efficiency is to eliminate the drilling-time variability. In other words, producers want all wells to be their best wells drilled.

A step forward would be to get men off the rig floor and away from the heavy equipment involved in drilling

Another goal of the increased focus on rig efficiency is to improve safety at the rig site. A step forward would be to get men off the rig floor and away from the heavy equipment involved in drilling, which means figuring out how to change the “heavy” equipment of a drilling rig – the pipe hoisting equipment and the machinery to handle fluids. Equipment manufacturers and drilling contractors are hard at work attempting to eliminate these problems, but automated drilling systems still must be prepared for manual intervention.

A producer commented that the greatest value of new technology is that which can be used company-wide

Improving rig efficiency will also mean that drilling costs can be lowered with or without increased rig automation through the application of technology that can lead to improved exploration expertise. A producer commented that the greatest value of new technology is that which can be used company-wide. The least useful are technologies that are proprietary to the service company or contract driller. As an indication of the improvements that are coming from improved rig efficiency, a representative from Anadarko Petroleum (APC-NYSE) discussed his company's exploration and development efforts in the shale formations of the southern region of the United States where the company operated 30 rigs and drilled 600 wells in 2013. Specifically in the Eagle Ford, Anadarko has 10 rigs and drilled 200 wells in 2011, but it is on a pace to drill 400 wells this year. In 2011, the average well required 12 days to drill but today that average well only needs eight days. In 2011, the record well (based on the time from spud to rig release) had been 8.5 days, which is now down to 4.5 days. It is this improvement in drilling rig efficiency that "is why the rig count no longer matters," he said.

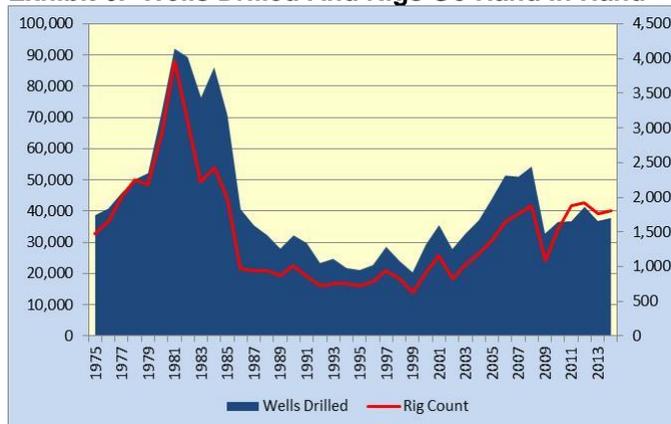
The point that several of the producers on the panel made was that there are many considerations in drilling wells that do not necessarily translate into the need for ever-increasing speed

During the open discussion period of the conference, a question was posed to the panel of producers that brought an interesting response relative to rig efficiency. The question was: "Twice the time, or a third of the cost?" The point the questioner was raising was what was more important to the producer – the time required to drill a well or the cost to drill it? In order to cut the cost of drilling by one-third, it is necessary to drill twice as fast. But as another questioner pointed out, drilling faster doesn't mean it is the most efficient process. Besides, drilling faster may ignore the issue of production. Yes, the production would start earlier if the well is drilled faster, but the ultimate recovery (total well production) and the well's production profile could be damaged by drilling too fast. The point that several of the producers on the panel made was that there are many considerations in drilling wells that do not necessarily translate into the need for ever-increasing speed. The direction of the discussion mirrored those we heard years ago of the different objectives and financial incentives within oil companies for the people responsible for drilling wells and those in charge of completing and producing them. The staffs in the drilling departments of oil and gas producers historically were incentivized to drill wells at the lowest cost possible. That meant hiring the lowest cost contract driller and using the least costly drilling supplies. When the drillers were successful, the staffs of their company's production departments often complained about the lousy condition of the wellbores and how the process of drilling the well damaged the formation making it more expensive to complete the well and often limited the volume of hydrocarbons that would be recovered from the well.

Producers have worked to improve the teamwork of drilling, completing and producing wells in order to maximize output for the least costly well. Some companies seem to do a better job in this regard than others. It seemed that the thrust of the discussion about

this struggle for improved rig efficiency did not necessarily mean greater rig automation. In our search to better understand the rig efficiency issue, we decided to examine some historical statistics about drilling in the United States.

Exhibit 6. Wells Drilled And Rigs Go Hand In Hand



Source: EIA, Baker Hughes, PPHB

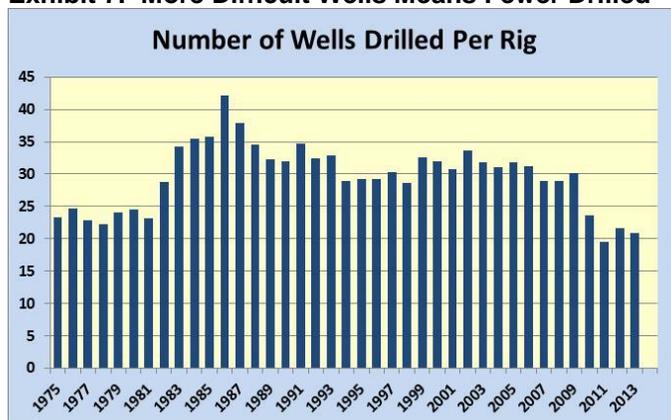
The history of drilling, even last year, shows a close association between the rig count and the number of wells drilled

The first chart (Exhibit 6) examines the number of wells drilled in the United States and the annual rig count since 1975 through 2013. While the popular view is that the rig count no longer matters, the history of drilling, even last year, shows a close association between the rig count and the number of wells drilled.

As the industry has almost totally focused on drilling shale wells, the number of wells drilled per rig has declined to levels below those of the 1970s

A more interesting chart (Exhibit 7) is one showing the average number of wells drilled per rig during 1975-2013. What the chart shows is that in recent years, as the industry has almost totally focused on drilling shale wells, the number of wells drilled per rig has declined to levels below those of the 1970s. Part of the explanation is that the nature of the wells being drilled has changed. Recent wells tend to be deeper and have longer lateral sections.

Exhibit 7. More Difficult Wells Means Fewer Drilled

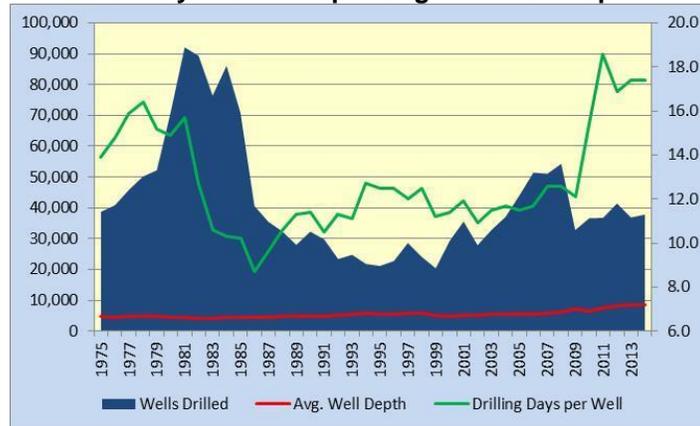


Source: EIA, PPHB

The chart shows that there has been a sharp increase in the number of days required to drill the average well at the same time the average well depth has increased

That conclusion is borne out by Exhibit 8 that shows not only the number of wells drilled but also the average well depth and the number of days needed to drill the average well. The days to drill a well is potentially overstated because we have assumed that each rig in the Baker Hughes weekly rig count worked for seven days. Because there is no data base of when rigs spud wells and when they are released, as exists in Canada, our assumption may be overstating the number of days. Our defense is that we have used this methodology consistently for all years in the survey period, so all years would be overstated, which is likely to average out over the time period. The chart shows that there has been a sharp increase in the number of days required to drill the average well at the same time the average well depth has increased, something that would appear to be a logical conclusion.

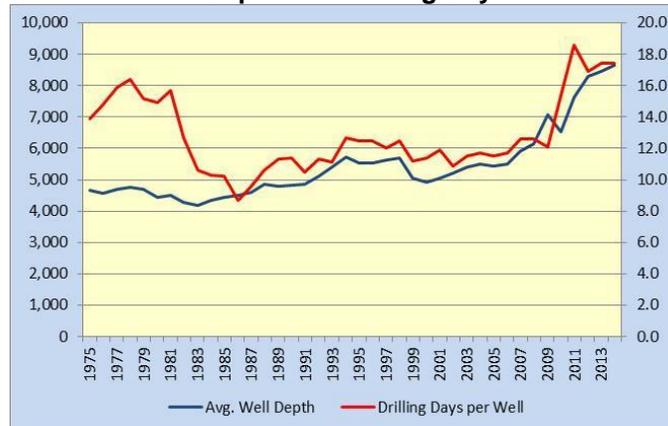
Exhibit 8. Days To Drill Up Along With Well Depth



Source: EIA, Baker Hughes, PPHB

When one plots just drilling days and well depth, the closeness of the relationship becomes clear, as shown in Exhibit 9 below.

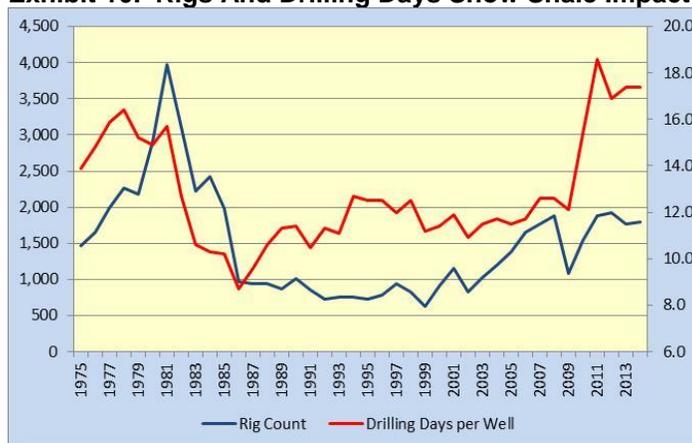
Exhibit 9. Well Depth And Drilling Days Track Closely



Source: EIA, Baker Hughes, PPHB

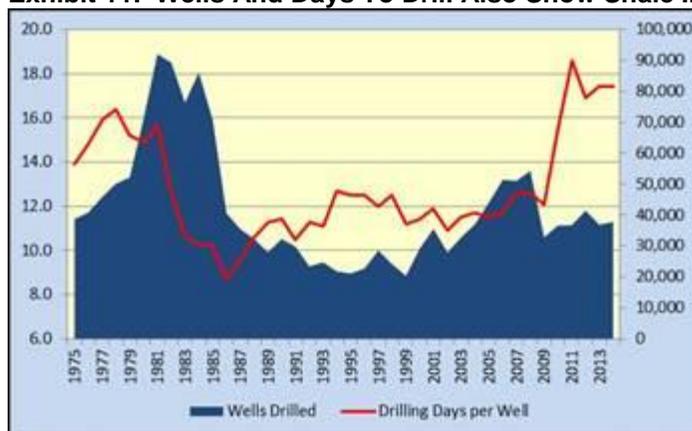
Two other charts validate this relationship. The charts below show the relationship between the rig count and the days to drill wells (Exhibit 10) along with wells drilled and the number of days to drill each well (Exhibit 11).

Exhibit 10. Rigs And Drilling Days Show Shale Impact



Source: Baker Hughes, PPHB

Exhibit 11. Wells And Days To Drill Also Show Shale Impact



Source: EIA, Baker Hughes, PPHB

Producers understand that unless they can improve the performance of their drilling operations, their ability to maximize shale profitability will remain challenged

When we completed our review of the drilling data, we believe that part of the push for increased rig efficiency is producers' understanding that unless they can improve the performance of their drilling operations, their ability to maximize shale profitability will be challenged, meaning that without drilling improvement, producers will need significantly higher commodity prices to establish profitability. The fastest way to boost oil and gas prices would be for producers to reduce shale output or to stop drilling. Unfortunately, taking either of those steps would hurt production and reserve growth of individual companies that would be detrimental to their share price and/or the financial support they are receiving from Wall Street and private equity investors.

The Age of Austerity has emerged from the clash of rising finding and development costs, higher production costs, and the need for producers to generate a current return for their shareholders

At the drilling rig automation conference, the representative of the producer who commented that “the rig count no longer matters,” also stated emphatically that his company would be living within its budget in the future. This is the Age of Austerity for the oil and gas industry and it has emerged from the clash of rising finding and development costs, higher production costs, and the need for producers to generate a current return for their shareholders. We are probably at a critical juncture for the future of the domestic oil and gas business that may not be fully appreciated by everyone.

Status Of The Climate Change Political Money War

Mr. Steyer has trumpeted his pledge to the Democratic Party that he would give it, or directly to Democrats engaged in tough political races, \$50 million of his own money to be matched by \$50 million from other donors whom he or the party would recruit

Several weeks ago, the Washington news service, *Politico*, reported on the state of fund-raising by former Farallon Capital Management hedge fund manager and now environmental activist Tom Steyer, who is backing selected Democratic politicians who favor aggressive action to limit carbon emissions. Mr. Steyer has trumpeted his pledge to the Democratic Party that he would give it, or directly to Democrats engaged in tough political races, \$50 million of his own money to be matched by \$50 million from other donors whom he or the party would recruit. *Politico* reported that based on filings as of June 4th with the Federal Election Commission (FEC), essentially half way through the year, Mr. Steyer’s political action group, NextGen Climate Action Committee, had raised \$210,000 in outside money. According to the report, \$100,000 came from Larry Linden, a former Goldman Sachs (GS-NYSE) executive and conservation philanthropist, \$100,000 from the American Federation of State, County and Municipal Employees union, with the remaining \$10,000 from Florida attorney and Democratic fundraiser Mitchell Berger.

There is still time for NextGen to raise and donate significantly more money, and even reach Mr. Steyer’s stated goal

The FEC report indicated that Mr. Steyer put \$2.1 million of his own money into the fund. The report said that the fund had funneled \$5 million, previously reported, to the Senate Majority PAC. While there are still five months left before the mid-term elections, there is still time for NextGen to raise and donate significantly more money, and even reach Mr. Steyer’s stated goal. However, based on the aggressive environmental campaign pro-climate change activists have mounted during the first half of this year, we were very surprised how little outside money NextGen has been able to raise. Is this another demonstration of the hypocrisy of the liberal political community that advocates radical social and economic actions but does not commit to the plans with its actions?

According to the Treasury Department, in Fiscal 2013 the fund received \$1,763,574.56 in donations

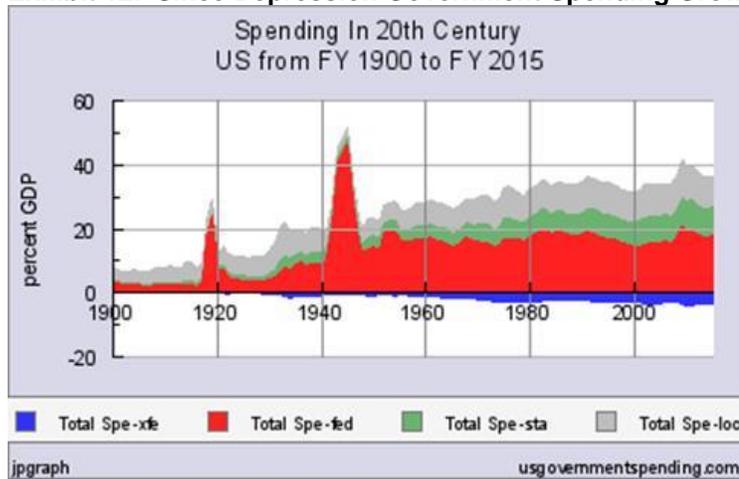
A classic liberal focus is to raise taxes on high income earners because the growth in the nation’s debt and the government’s annual spending requires more tax revenues. A retort to those claiming the nation needs higher taxes and greater revenue for the government is that there is a voluntary program run by the U.S. Treasury that accepts donations of money dedicated to reducing the nation’s debt. According to the Treasury Department, in Fiscal 2013 the fund received \$1,763,574.56 in donations. That amount has

A \$3.1 million payment on a total debt of \$17.5 trillion or even the \$12.5 trillion is an infinitesimal reduction

jumped significantly in Fiscal 2014 year to date. For the months of October 2013 through April 2014, the Treasury received \$3,084,773.01. Interestingly, total receipts were boosted by February receipts totaling \$1,705,574.49, which nearly matched the donation total for all of the prior fiscal year. Unfortunately, we cannot tell whether the February receipts came from multiple donations or was from a major bequest, such as on the death of a taxpayer. To put this sudden surge in debt-repayment donations in perspective, total debt of the United States government at April 20, 2014, was \$17,508,437,000,000 (\$17.5 trillion). The component of that total debt held by the public was \$12,503,468,000,000 (\$12.5 trillion). Moreover, the Fiscal 2014 federal budget was estimated by the Obama administration to show outlays of \$3,778 billion against projected receipts of \$3,034 billion, leaving an estimated deficit of \$744 billion. A \$3.1 million payment on a total debt of \$17.5 trillion or even the \$12.5 trillion is an infinitesimal reduction. In fact, if the budget deficit projection is right, the debt repayment donation would barely offset two and a half minutes of government deficit spending!

Putting the spending in perspective, we have a chart in Exhibit 12 showing spending by federal, state and local governments as a percentage of gross domestic product (GDP). The chart shows the cumulative spending since 1900.

Exhibit 12. Since Depression Government Spending Growing



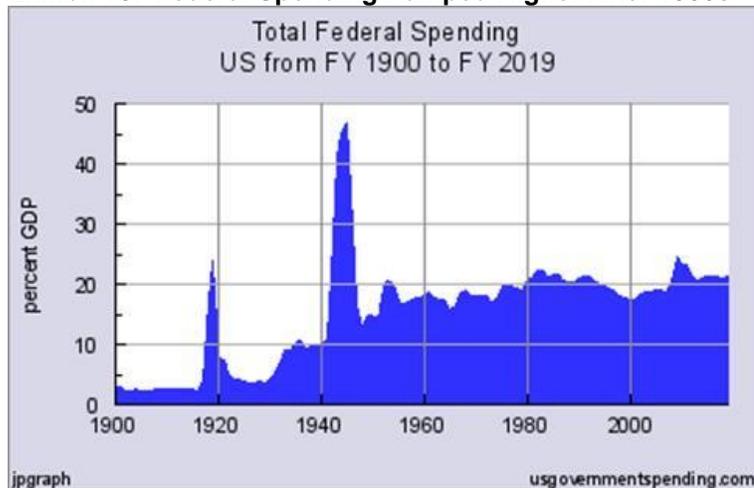
Source: usgovernmentspending.com

Outside of government spending for the Civil War and World War I, America was able to build a transcontinental nation with substantial economic power while spending a very low percentage of our GDP

Two other charts of interest (next page) show the percentage of GDP represented by federal spending. One chart shows spending since 1900 and projected through Fiscal 2019. The second chart shows the percentage of federal spending since the start of our nation in 1792 through projected spending for Fiscal 2019. The key visual from these two charts is that outside of government spending for the Civil War and World War I, America was able to build a transcontinental nation with substantial economic power while spending a very low percentage of our GDP. Subsequent to the

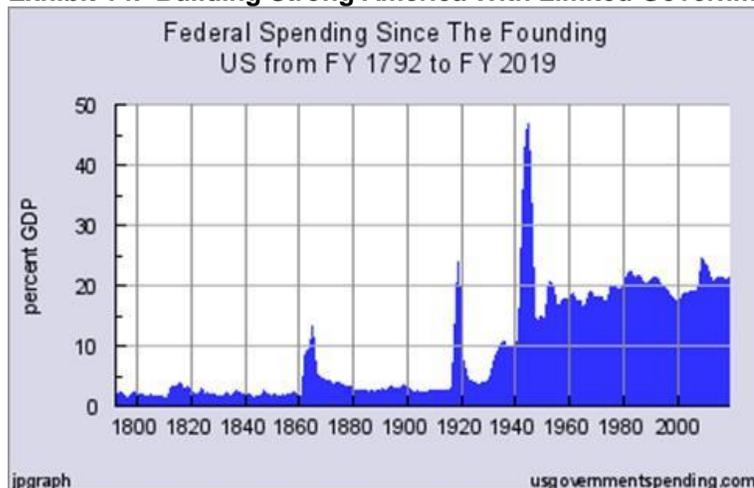
Great Depression, the magnitude of government spending changed dramatically.

Exhibit 13. Federal Spending Ramped Higher After 1930s



Source: usgovernmentspending.com

Exhibit 14. Building Strong America With Limited Government



Source: usgovernmentspending.com

Don't be surprised if some of these billionaires ante up donations to promote politicians dedicated to pushing a climate change agenda rather than paying down our debt

Results so far this fiscal year have shown the government receiving greater receipts than estimated, which has resulted in a reduced deficit projection. The point is that even with a jump to nearly \$3.1 million in donations through the first seven months of Fiscal 2014, little progress is being made in debt reduction. In order to make more progress, we need some of those billionaires to donate their entire wealth to make any meaningful dent in the amount of our outstanding debt. Don't be surprised if some of these billionaires ante up donations to promote politicians dedicated to pushing a climate change agenda rather than paying down our debt.

China Struggles With Pollution And Economic Growth

As China's economy transitions from export-driven to consumption-based, energy demand in the country continues to grow at a rapid rate along with the nation's carbon emissions

Economists and investors have been fixated on the dramatic growth of the Chinese economy since before the turn of the century. The country's growth, largely driven by cheap labor and the government's willingness to base its economy on the health of its export industries, has helped to power global economic growth. At the same time, China's economic impact has boosted the world's energy appetite, largely fueled by burning fossil fuels. Today, these same observers are concerned about the possibility that China's economic growth rate will permanently slide into a lower range that will drag down overall global growth. But at the same time, as China's economy transitions from export-driven to consumption-based, energy demand in the country continues to grow at a rapid rate along with the nation's carbon emissions. Media reports about, and visitors to, many of China's leading cities remark about the decline in the air quality of these cities due to the growth of their vehicle fleets and the need for more electricity that is being provided by coal-fired power plants. Is there an alternative future for China?

This spring, the Chinese government announced that it planned to remove more than five million ageing vehicles with poor fuel economy and emissions levels in an attempt to improve air quality. Beijing, notorious for its poor air quality, is slated to remove 330,000 vehicles as part of the plan. In addition, 660,000 substandard vehicles will be removed from the highways of the province of Hebei, home to seven of China's smoggiest cities in 2013.

In 2013, Beijing cut the number of new license plates it would issue by 150,000, a 37% reduction from its prior issuance goal

As part of its environmental improvement effort, Beijing plans to limit the total number of cars on the road to 5.6 million this year with the fleet only growing to six million cars by 2017. In 2013, Beijing cut the number of new license plates it would issue by 150,000, a 37% reduction from its prior issuance goal. In addition, Beijing will pay the owners of another 200,000 vehicles to have them upgraded to improve their fuel-efficiency and emissions.

In the past, Beijing's municipal government has offered vehicle owners subsidies of 2,500 to 14,500 yuan (\$400 to \$2,300) to hand over their ageing vehicles, but the subsidy didn't cover so-called "yellow label" cars that fail to meet even minimum gasoline standards

The State Council's document announcing its planned restrictions on vehicle fleet growth and emissions improvement did not disclose exactly how the plan would be implemented. In the past, Beijing's municipal government has offered vehicle owners subsidies of 2,500 to 14,500 yuan (\$400 to \$2,300) to hand over their ageing vehicles, but the subsidy didn't cover so-called "yellow label" cars that fail to meet even minimum gasoline standards, sometimes even from the day they roll off the assembly line. There is discussion that the government may also target upwards of 5.3 million of these yellow label vehicles to further accelerate the environmental clean-up effort. Beijing has restrictions against these yellow label cars from entering the city, but it currently lacks the monitoring and enforcement capability to ensure that these cars are banned, plus drivers have learned ways to avoid detection.

The plan also envisions China reducing energy consumption per unit of growth by 3.9% both this year and in 2015 in order to meet its 16% reduction target

China's demographics add another consideration for the government as it works to balance economic growth with cleaning up its environment while at the same time maintaining social stability

These models have determined that too much CO₂ in the atmosphere will contribute to a greater than 2° C rise in the global temperature by 2100

China's atmospheric clean-up effort is also targeting the closure of coal-fired heating systems and the installation of equipment to reduce sulfur dioxide and nitrogen oxide emissions at power stations, steel mills and cement plants. The recent natural gas import deals China has struck with Russia for pipeline gas from Siberia and BP Ltd (BP-NYSE) for additional liquefied natural gas (LNG) imports are moves designed to provide the country with energy supplies having lower carbon emissions. China is stepping up its effort to develop its shale gas resources, although the pace of that effort and its technological progress has been slow. The country has a goal of cutting its carbon emissions per unit of economic growth by more than 4% this year and more than 3.5% in 2015 as it tries to meet its binding 17% reduction target set in the nation's 2011-2015 five-year plan. The plan also envisions China reducing energy consumption per unit of growth by 3.9% both this year and in 2015 in order to meet its 16% reduction target.

The recent gas deals were announced about the same time China held preliminary discussions with the United States about ways to potentially reduce carbon emissions in keeping with the global effort to limit the rise in greenhouse gas emissions in order to forestall further climate degradation. Whether anything comes from these discussions remains to be seen, but we have to believe the efforts will be undertaken within the context of not choking off China's economic growth, as to slow a growth will produce fewer jobs that could lead to social and political unrest due to growing numbers of unemployed Chinese men. China's demographics add another consideration for the government as it works to balance economic growth with cleaning up its environment while at the same time maintaining social stability.

The Importance Of Social Science In Environmental Debate

The first Earth Day was held in 1969 and we remember walking by the rally in Philadelphia where we worked. That celebration was instrumental in helping elevate concern about the environment in the minds of Americans. Since those early beginnings of the environmental movement, we have progressed to a huge social movement inclined to radically alter the current economic and social structure of the developed world in an effort to initially limit, but then subsequently to reduce, the volume of carbon emissions released into the atmosphere. The goal of reducing carbon emissions is to help minimize the environmental damage to the planet from a hotter atmosphere caused by these heat trapping emissions. Computer models have predicted that once the earth has more than 400 parts of carbon dioxide in the atmosphere, civilization is at risk of extreme temperatures, melting glaciers, rising sea levels and more violent and severe storms. These models have determined that too much CO₂ in the atmosphere will contribute to a greater than 2° C rise in the global temperature by 2100 that they are sure will trigger the adverse impacts to the global eco-system cited above.

Not only has the average temperature in the U.S. remained essentially flat over this extended period, the frequency and intensity of hurricanes and tornadoes has declined

For many years, the scientists leading the charge to stop the burning of fossil fuels because of the potential damage from the release of carbon emissions identified the issue as “global warming.” In recent years, the environmental movement changed the terminology for describing this condition to “climate change.” The shift has been greeted by opponents of global warming as their opponents’ admission that the surface global temperature has failed to warm over the past 17 years, clearly befuddling the climate models that were forecasting escalating temperatures as a result of rising carbon levels and that would produce catastrophic weather events due to this continual warming. Not only has the average temperature in the U.S. remained essentially flat over this extended period, the frequency and intensity of hurricanes and tornadoes has declined.

The terminology choice can play a role in how the debate is conducted

While scientists, pseudo-scientists and politicians do battle with climate change deniers, as they are being cynically labeled by even President Barack Obama, over the measurement of the temperature, what level of carbon emissions triggers weather events and whether any of the carbon increase can be tied to activities of humans. While most people engaged in the debate or reporting on it use “global warming” and “climate change” synonymously, a recent study has shown that the phrases have sharply different meanings to various segments of the population. In fact, the terminology choice can play a role in how the debate is conducted.

it concluded that the phrase “global warming” is scarier than “climate change”

The study was prepared by scientists at the Yale Project on Climate Change Communication and the George Mason University Center for Climate Change Communication and it concluded that the phrase “global warming” is scarier than “climate change” even though one is more scientifically accurate and the other is actually a subset of the broader term. So the question addressed by the study was how does the choice of which phrase to use impact how readers and listeners react?

The term climate change has been used much longer than global warming and is scientifically more accurate

It is interesting to learn that the term climate change has been used much longer than global warming and is scientifically more accurate. It may be one reason why the phrase has been incorporated into the name of the United Nations Intergovernmental Panel on Climate Change. The terminology dates its initial use to 1956, some 20 years before global warming began to be used in 1975. The similar term, “climatic change,” was first used in a paper, “Carbon Dioxide and the Climate” published in *American Scientist*, by Gilbert N. Plass, the Canadian born physicist who taught at Texas A&M University. In 1975, geoscientist and professor of climate science at Columbia University, Wallace Broecker, often referred to as the Grandfather of Climate Science, first coined the phrase “global warming” in his book [Fixing Climate](#).

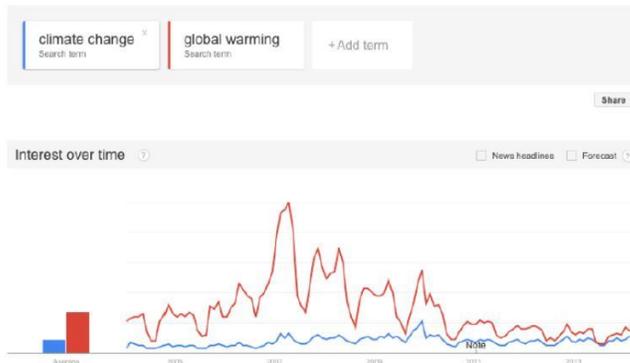
The term “global warming” means the increase in the Earth’s average surface temperature since the Industrial Revolution, primarily due to the emission of greenhouse gases from the burning

Scientists prefer to talk about climate change because people do not feel temperature on a global basis

of fossil fuels and changes in land use, whereas “climate change” refers to the long-term change of the Earth’s climate including changes in temperature, precipitation, and wind patterns over a period of several decades or longer.

Scientists prefer to talk about climate change because people do not feel temperature on a global basis. As a result, they have spent decades and untold effort attempting to demonstrate the link between rising greenhouse gas concentrations and the aspects associated with climate change that are local and more easily felt by people than a single temperature figure on a chart. The problem with the choice of climate change is that the concept is complex and nebulous and lacks the vivid imagery of global warming.

Exhibit 15. Relative Google Searches For 2004-2014



Source: Yale and George Mason Universities

Prior to 2011, there were more internet searches for global warming than climate change, with a peak interest in global warming in 2007

One thing the study discovered was that for the past couple of years, Google searches for the term global warming were about the same as for climate change, and both were at a relatively low level. Prior to 2011, there were more internet searches for global warming than climate change, with a peak interest in global warming in 2007, about the time that the U.S. Supreme Court ruled that the Environmental Protection Agency had the authority to regulate carbon dioxide to protect human health, and two months after the movie “An Inconvenient Truth” by former Vice President Al Gore was awarded an Academy Award for Best Documentary.

A nationally representative survey conducted during November and December 2013 found that almost without exception, the term global warming is more engaging than climate change. Compared to climate change, the term global warming generated some of the following reactions, which we selected as representative of all those listed and reported on:

- Stronger ratings of negative effect, especially among women, Gen Y, the Greatest Generation, African-Americans, Hispanics, Democrats, Independents, Moderates, conservatives and evangelicals;

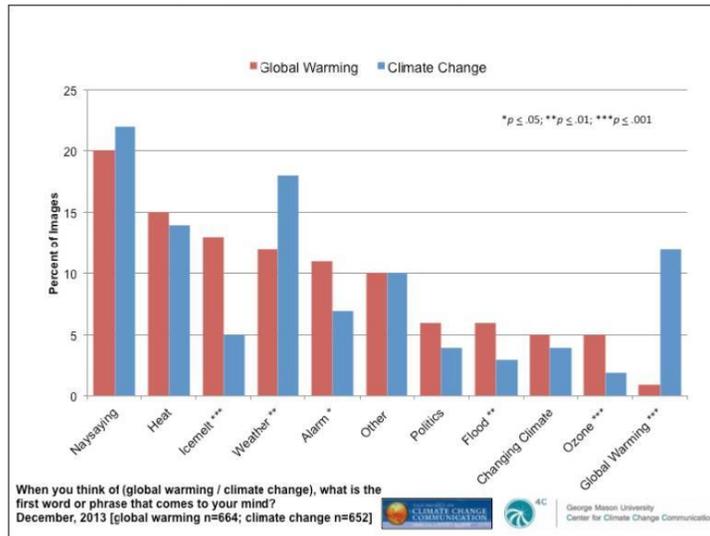
- Greater certainty that the phenomenon is happening among men, Gen X, and liberals;
- Greater understanding that human activities are the primary cause among Independents;
- A more intense worry about the issue among men, Gen Y, Gen X, Democrats, liberals and moderates;
- A greater sense of personal threat, especially among women, the Greatest Generation, African-Americans, Hispanics, Democrats, Independents, Republicans, liberals and moderates;
- A greater sense of threat to future generations among Independents and Gen Y;
- A greater sense that people in the U.S. are being harmed right now, especially among Independents, Gen Y, and Hispanics;
- A stronger belief that weather in the U.S. is being affected a lot among Independents and Republicans, and
- Higher issue ratings for action by the president and Congress, especially among women, Democrats, liberals and moderates.

“It’s time for us to start talking about ‘climate change’ instead of global warming... ‘climate change’ is less frightening than ‘global warming.’”

The significance of this language and emotional difference was observed and capitalized on by Republican pollster and political strategist Frank Luntz who wrote a secret memo to President George Bush’s administration prior to the 2002 mid-term elections. He wrote: “It’s time for us to start talking about ‘climate change’ instead of global warming... ‘climate change’ is less frightening than ‘global warming.’” As one focus group participant noted, climate change “sounds like you’re going from Pittsburgh to Fort Lauderdale.” While global warming has catastrophic connotations attached to it, climate change suggests a more controllable and less emotional challenge.”

A chart from Yale and George Mason Universities plotted the first word association to the terms global warming and climate change. As one would expect, the word association experiment produced a wide range of first words, but the researchers were able to group them into a number of broad categories. An interesting observation was the strong relationship between ice-melt and global warming compared to the listing of climate change in response to weather. The former relationship is much more graphic and connotes grave

Exhibit 16. First Word Association To Climate Phraseology



Source: Yale and George Mason Universities

damage and potential harm while the latter association is more benign.

The New York Times conducted an analysis of the terminology in President Bush’s environmental speeches in 2001, and then subsequent to receiving Mr. Luntz’s memo. In 2001, global warming appeared in a number of President Bush’s speeches, but afterwards the White House shifted to a consistent use of climate change.

The study found that Americans are 13 percentage points more likely to say that global warming is a “bad thing” (76%) than climate change (63%). So if you want to talk about the future of the planet, the phrase “global warming” creates a much more powerful, or fearful image in the minds of listeners. On the other hand, if you want to minimize the power of language to motive action on the part of listeners, you should refer to the issue as “climate change.” One of the points made by the study was that the use and reaction to words and phrases can change, so be prepared to see more polling of Americans of various selected groups in response to the quest to understand the power of words such as climate, warming, temperatures, and weather events, to name a few.

The study found that Americans are 13 percentage points more likely to say that global warming is a “bad thing” (76%) than climate change (63%)

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