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ENERGY INVESTMENT BANKING

# MUSINGS FROM THE OIL PATCH

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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

## Are We Entering The Capitulation Phase of Industry Cycle?

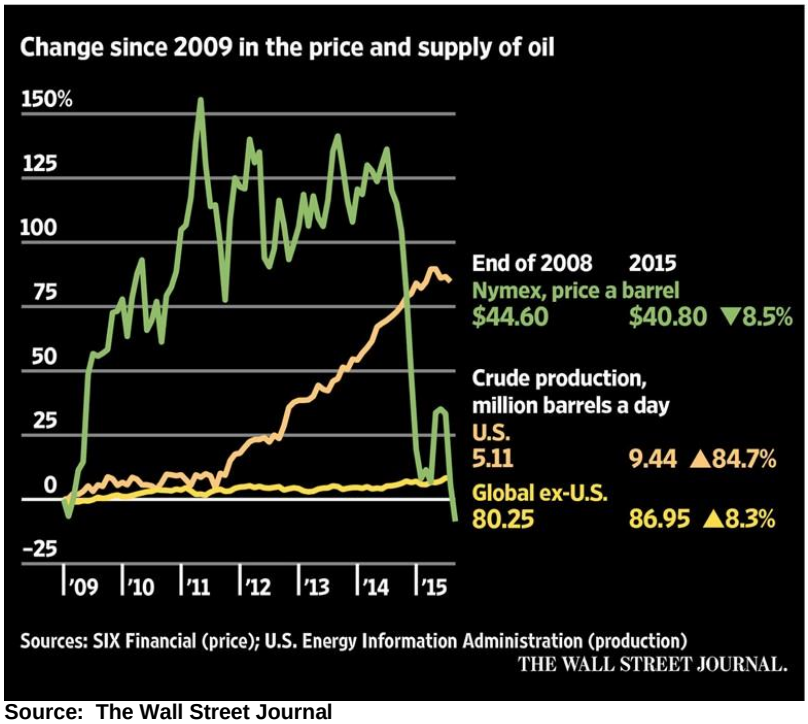
**The challenge is that the level of despair and destruction must rise much higher than we are initially witnessing**

Oil price action during the past two weeks may be signaling that we are entering the "capitulation phase" of the oil industry cycle. If so, news and angst within the business will grow worse as despair and panic will come to dominate the outlook. Surprisingly, this may be a good thing. The challenge is that the level of despair and destruction must rise much higher than we are currently witnessing. But various data points suggest we may be seeing the first shifts in industry mindsets that will lead to substantive actions that will cause industry's fundamentals to change. While some readers might think we are crazy to suggest that events are setting the stage for the industry's recovery, we would point out that our concept of a recovery may not match what others consider a recovery – but that's a discussion for another *Musings*.

**The drilling rig count continued to grow after the June oil price peak**

A quick review of the industry cycle to date will set the stage for the balance of our discussion. Crude oil prices peaked in June 2014 and slowly slid down as we transitioned from mid-summer to late fall that year. During the fall of last year, the industry's focus was on the growing surplus of global oil output with most of the attention directed to the rapid growth in U.S. liquids supply due to the success of the shale revolution. The drilling rig count continued to grow after the June oil price peak. It rose almost up to the shock of OPEC's decision in late November, led by Saudi Arabia, to allow market forces to determine global crude oil prices, which changed the industry's future. As crude oil prices fell from over $100 a barrel in mid-June 2014 to the $80s a barrel in November, the Baker Hughes (BHI-NYSE) active drilling rig count rose from roughly 1,850 rigs (1,540 oil and 310 gas rigs) to 1920 rigs (1,575 oil and 345 gas), or a nearly 4% increase.

**Exhibit 1. U.S. Oil Production Grows While Oil Price Falls**




**Source: The Wall Street Journal**

**The Kingdom's announcement signaled it was shifting its oil strategy from defending high prices to reclaiming the market share it had lost**

After that fateful OPE meeting and Saudi Arabia's declaration that it would continue to produce at its highest level ever and allow oil prices to find a market-clearing price. The Kingdom's announcement signaled it was shifting its oil strategy from defending high prices to reclaiming the market share it had lost by following its prior policy of defending high oil prices. For most of November prior to the OPEC meeting on Thanksgiving Day, the media chronicled the travels of OPEC oil ministers going from meeting to meeting involving both OPEC members and non-OPEC producers seeking to orchestrate a coordinated global oil production cut. That hope was dashed with Saudi Arabia's announcement.

**The industry's future would be markedly different from the consensus assumption that oil prices would stay in the $80-$100 a barrel range**

What most industry participants and analysts understood was that OPEC's decision would dramatically alter the industry's future. The consensus assumption that oil prices would stay in the $80-$100 a barrel range was no longer operable – profitability would be under significant assault. The questions everyone sought answers to were: How quickly would oil prices fall? How low would they fall? How much oilfield activity would be lost? What would happen to E&P economics and the financial health of the service industry? Management teams went into over-drive through the end of 2014 revising their 2015 business plans and future strategies based on their assessment of answers to the above questions.

As E&P and oilfield service companies reported their year-end earnings, management teams began addressing their revised

business plans. The actions required to adjust business plans were dictated by management's view of the length and depth for this industry downcycle. Super-imposed on those business plan adjustments were considerations dictated by the state of company balance sheets, which often forced more unpleasant decisions.

**Some cuts appeared drastic while others seemed more moderate**

As oilfield activity collapsed, service companies were the first to move by slashing field workforces and home office support personnel. Some cuts appeared drastic while others seemed more moderate. The magnitude of the reductions reflected either the optimistic or pessimistic view management teams held of their future. Analysts, industry management teams and investment professionals debated the answer to the length and depth question by picking a letter of the alphabet that would best mirror the shape of the decline and recovery of oil prices. The choices – "V", "U", "W" and "L" – are based on examining past drilling rig cycles and trying to match the current industry cycle against them.

**Multiple forecasters have cut their oil price projections for 2015, but importantly they have cut them for 2016, which signals that they believe tough times for the oil patch will continue until 2017**

With the recent completion of the second quarter earnings reporting season, combined with July's dramatic oil price decline – the worst monthly drop since the 2008 financial crisis - and last week's fight to hold oil prices above $40 a barrel, despair over the outlook has engulfed the industry. Multiple forecasters have cut their oil price projections for 2015, but importantly they have cut them for 2016, which signals they believe tough times for the oil patch will continue until 2017. These oil price forecast cuts coincided with energy company announcements of additional capital spending reductions, layoffs of more employees and consultants and other steps to preserve balance sheet strength by cutting dividends, stopping or severely reducing stock buybacks, and selling assets to reduce debt. Those companies most financially levered and suffering significant declines in revenues have been forced to seek bankruptcy protection. That assumes they could not restructure their debt to allow the company to continue to operate without significant debt relief. The blood-letting is now beginning!

**The energy business has raised substantial capital in the first half of 2015**

One ingredient in this downcycle not as evident in past cycles is the role of capital – both public and private. As we have written about in the past, the energy business has raised substantial capital in the first half of 2015. According to the *Financial Post*, Canadian publicly-traded E&P companies raised C$10.5 (US$8.0) billion in 2015's first half, up from C$8.2 (US$6.2) billion in 2014's second half, but down from the C$11.4 (US$8.6) billion raised in the first half of 2014. In the U.S., news service *Bloomberg* reported that E&P companies have raised over $1 billion per month in new equity for the first six months of 2015, but in July, as the oil price was collapsing, the industry could only raise $300 million of new equity. During the first half of 2015, the E&P industry sold $6 billion in assets and the outlook is for increased sales volumes through the end of year. The *Bloomberg* article quoted John Walker, the CEO of EnerVest Ltd., a Houston-based investment firm that specializes in

buying and operating orphaned assets, as saying that he believed there could be as much as $20 billion in E&P asset sales before the end of the year. All of these capital-raising activities are supplemented by the billions of dollars of private equity capital available that is targeting energy investments.

**The window for energy companies to tap capital markets is now essentially closed**

The only piece of good news in the above recap of capital flows into the energy sector is that in July, the industry could only raise a fraction of what its average monthly take had been during the prior six months. We know investment bankers are suggesting to management teams that the window for energy companies to tap capital markets is now essentially closed. The bankers hope the capital window may re-open following Labor Day, but that judgement was made prior to the oil price and stock market falls of last week.

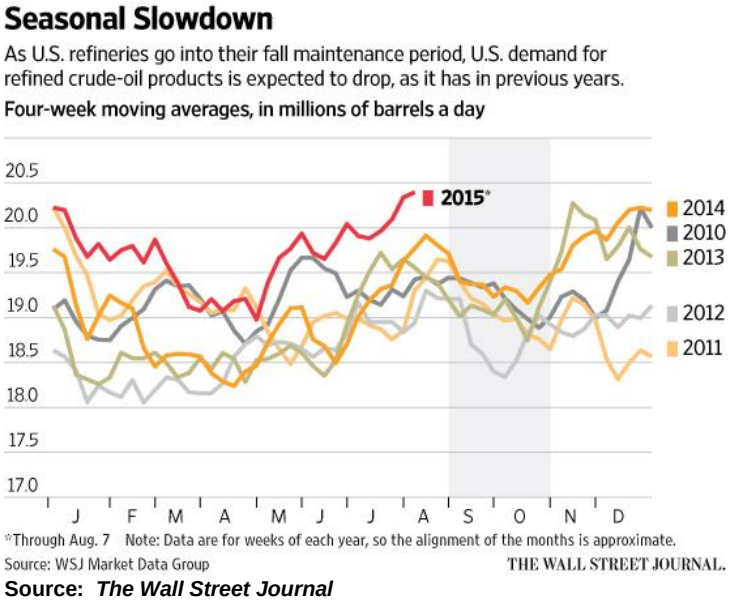
**Valuations will change as investors gain greater confidence in the industry's outlook, even if it is bad**

Private equity funds continue to prowl the energy sector seeking attractive investment opportunities. So far, they have been thwarted by the readily-available capital from public markets and the lack of agreement on the value of assets and/or companies being marketed. These valuations will change as investors gain greater confidence in the industry's outlook, even if it is bad. Valuations may be changing as we write this article. That change is necessary as a first step in this phase of restructuring the industry.

**During September, crude oil demand weakens**

One of the greatest challenges for oil prices in the near term is the calendar. We are moving into that time of the year when North American energy demand weakens due to the end of the summer vacation season. That means driving slows and gasoline demand weakens. As a result, refiners shut down their plants to re-configure

**Exhibit 2. September Refinery Demand Hurts Oil Prices**




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

them to produce more heating oil and less gasoline as they prepare for the upcoming winter. During September, crude oil demand weakens as shown in Exhibit 2. Low U.S. oil demand will put greater downward pressure on crude oil prices.

**This chaos also arrives just as commercial banks enter their borrowing-base redeterminations for their E&P company borrowers**

Lower crude oil and natural gas prices mean the E&P industry will have less revenue and less cash flow to reinvest in their business. The magnitude of the cash flow reduction also depends on companies' finances, i.e., how much debt they have. The shock from the collapse of crude oil prices in recent weeks, merely a couple of months after they had rebounded from the low $40s a barrel to over $60 a barrel this spring, comes just as management teams are starting their 2016 budgeting process. This chaos also arrives just as commercial banks enter their borrowing-base redeterminations for their E&P company borrowers. This is a critical period for E&P companies as these redeterminations will provide a new assessment of the value of company assets and how much banks are willing or able to lend against them. To the extent E&P companies already have high debt loads, any reduction in their borrowing bases will force them to either raise additional capital or cut back their activities. Depending upon their options, they may even be forced to sell assets or possibly the company.

**Since oil prices are now sharply lower, these producers are left accepting spot oil prices, which will limit their ability to conduct activity in the future**

An additional factor impacting the E&P industry is the reduction in their portfolios of hedge contracts for their future oil production. For much of 2015, E&P companies have been living off past hedges that paid them maybe $80-$90 a barrel when the oil would have sold in the spot market for $50-$60 a barrel. The companies received an extra $30 a barrel in revenue and cash flow, which enabled some management teams to avoid the difficult cost-cutting decisions. As crude oil prices have traded within a $45-$60 a barrel range for most of 2015, the ability of E&P companies to hedge at meaningful premiums to current spot prices has been limited. When crude oil prices rallied this spring, some producers hedged production at marginal premiums to their costs. On the other hand, some E&P management teams found that the hedge price did not provide them with much profit over their cost so they elected to gamble that the oil price recovery would continue. Since oil prices are now sharply lower, these producers are left accepting spot oil prices, which will limit their ability to conduct activity in the future.

**This is part of the pain and blood-letting that must occur before the industry can correct itself**

These conditions are pressuring the E&P industry and will force companies to confront difficult choices – cut activity/spending more, seek financial relief in some manner, or elect to leave the industry. No choice is attractive. All of them entail pain – both emotional and financial. This is part of the blood-letting that must occur before the industry can correct itself. But we are actually seeing some tough decisions being made. About 20 oil sands expansion projects in Canada have been delayed. Consultant Wood Mackenzie says over 200 industry projects have been postponed, limiting future oil output. The latest offshore lease sale was the weakest since 1986.

Last week was the 20th annual EnerCom oil and gas conference. EnerCom is an energy company communications consultant that helps many with their investor relations efforts. When we were on Wall Street, we attended this conference, which is unique in that it welcomes both buyside and sellside energy investment professionals. One sellside E&P analyst attended the conference and provided comments about the presentations. His Day One report stated that EnerCom reported that their registration for the conference was 7% higher than in 2014. The firm also reported that companies had very high numbers of one-on-one investor meetings scheduled. The analyst reported that he mostly saw familiar faces in the audience, which supports the investment bankers' views that the public market window for energy companies to raise capital is now virtually non-existent. The industry will need "new" investors to successfully raise large amounts of new capital.

**Registration for the conference was 7% higher than in 2014**

This analyst made a couple of other interesting observations. He said he questioned E&P management teams about their view of the level for oil prices that would generate returns similar to those earned when crude oil was at $90 a barrel and finding and development costs were much higher than today's. In his view, the consensus was that $60-$70 a barrel is the "new $90 a barrel" oil given lower well costs and improved corporate efficiencies. He also said that producers acknowledged that returns were "skinny" with crude oil in the low $40s a barrel. We aren't sure what "skinny" equates to, but we suspect not much profit, if any at all.

**The consensus was that $60-$70 a barrel is the "new $90 a barrel" oil given lower well costs and improved corporate efficiencies**

We were interested in his other observation, which dealt with how producers are coping with the current environment. He said that producers seemed to be reverting to the "1980's playbook." What does that mean? How about drilling within cash flow and attempting to hold production flat. What novel concepts! What someone who didn't live through the '80's and '90's might not understand is that the playbook resulted from there not being cheap capital and private equity money available then. In fact, following the demise of Continental Illinois Bank in Chicago and Penn Square Bank in Oklahoma City, commercial banks almost outlawed energy lending in the 1980's as it was considered too speculative, so there was virtually no new capital available. Today, we live in a world driven by easy money policies globally, meaning zero interest rates, which contributed to the high oil prices of 2009-2014 and the surge in capital flowing into private equity funds. A recent quote from economist and money manager Gary Shilling highlights this phenomenon and its damage to the energy industry. He said:

**In fact, following the demise of Continental Illinois Bank in Chicago and Penn Square Bank in Oklahoma City, commercial banks almost outlawed energy lending as it was considered too speculative, so there was virtually no capital available**

"The oil optimists noted that earlier high oil prices, aided by low financing costs, had pushed up production, especially among U.S. frackers. Low prices, they reasoned, would curb production, especially since fracked wells tend to be short-lived and the cost of drilling new ones exceeded the depressed prices. But a funny thing happened on the way to $80 oil: The rally stopped dead in its tracks

**"Low prices, they reasoned, would curb production"**

at about $60 in May and June, then slid to the current $42, a new low.

“Me? I'm sticking with my forecast of $10 to $20 a barrel.”

Why does Mr. Shilling predict such a low oil price? His prediction rests on the economic principle that commodity prices are usually set by the marginal cost of production, which he believes is in the $10-$20 a barrel range for locations such as the Permian basin and the Middle East, among a few other conventional oil producing regions. In effect, Mr. Shilling is pointing to the underlying mechanics behind the commodity “super-cycle” that some people believe ended a few years ago. That view says we are firmly in the down part of the commodity cycle but that it will eventually return us to higher commodity prices but probably not for five or more years.

**Those high prices were necessary to drive producers to expand their capacity, which was made easier by zero interest rates following the 2008 financial crisis**

The concept underlying the super-cycle is that the boom in global demand for raw materials in response to high growth and the build-out of developing economies, especially China, caused an explosion in basic commodity prices. Those high prices were necessary to drive producers to expand their capacity, which was made easier by zero interest rates following the 2008 financial crisis. As the era of cheap capital continued, it drove commodity output and capacity growth, but economic weakness caused a collapse in demand that was magnified by the amount that commodity prices such as basic materials declined as producers were striving to make any profit or generate positive cash flow by selling their output. It was only as prices continued falling, reaching levels that inflicted significant damage on the financial health of these producers that production was shut down and new capacity additions deferred or stopped completely. Oil and gas seem to be the only commodities where producers have been reluctant to stop increasing their output. That would seem to be at odds with the sharp fall in the drilling rig count, but it may reflect the increased efficiencies within the E&P sector. What is unknown at the present time is whether the recent bump up in the drilling rig count reflects a delayed response to the higher oil prices seen in May and June, or the desperate actions of producers needing to generate any cash flow to try to survive this downturn.

**Our sense is that we may see the rig count begin to decline again**

A resumption in the decline in the drilling rig count would be a signal that producers were serious about ending their serial destruction of capital. Our sense is that we may see the rig count begin to decline again. It has already begun happening in Canada, which may signal that capital discipline is beginning to be embraced by producers up there. This would be another indication that we have entered into the capitulation phase of the industry cycle.

While we are laying out what may be taken as an optimistic industry outlook by suggesting we are entering the capitulation phase of the cycle, we would be negligent to not detail how the recovery might play out. In all honesty, we are not sure what the recovery’s

**Unfortunately, our "gut" says the recovery may not start until 2017 or maybe even later**

timing will be or how dramatic it might be. Our head says we could see all the conditions for an improvement to be in place by the end of 2015, some five months from now. Unfortunately, our "gut" says the recovery may not start until 2017 or maybe even later. At this point, we are confident that we are in the bottom phase of the industry cycle. The question is whether this will be a bottom shaped like the letter "U" or rather like a bathtub as suggested by others. Although we are confident that people are changing their outlooks, we are not convinced enough minds have been changed yet for a quick recovery to commence. Any near-term "U-shaped" oil price recovery, in our judgment, would likely morph into a "W" pattern and extend the ultimate recovery. For the time being, we will reserve describing our view of how the recovery will unfold.

## Defining The Future Economics Of The Oil And Gas Industry

**A growing concern is that once the oil price does land in the $30s a barrel, no one knows what will happen - fall further, rebound sharply or stay mired in the $30s for a while?**

With West Texas Intermediate (WTI) doing a perfect swan dive into the low $40 a barrel price range, everyone from energy industry executives and employees, to analysts and market forecasters is trying to gauge just how low prices might fall. Increasingly on the financial news shows and in energy industry publications, the thought that WTI's price might start with a three is no longer being ruled out. A growing concern is that once the oil price does land in the $30s a barrel range, no one knows what will happen – will they fall further, rebound sharply or stay mired in the $30s for a while?

**The question of WTI's price boils down to the daily interaction between supply and demand**

The WTI oil price is subject to influences from many market forces including those of speculative commodity trading, the periodic expiration of crude oil futures options, the value of the U.S. dollar and importantly, current and future projections for energy demand. That latter factor involves expectations about global economic growth and the geographic locus of that growth, demographic trends and geopolitical events. At the end of the day, the question about the course of WTI's price boils down to the daily interaction between supply and demand and expectations about how those two forces may vary in the future.

**Family formations and vehicle miles traveled are both rising calling into question the declarations that both trends would permanently lag their historical growth rates**

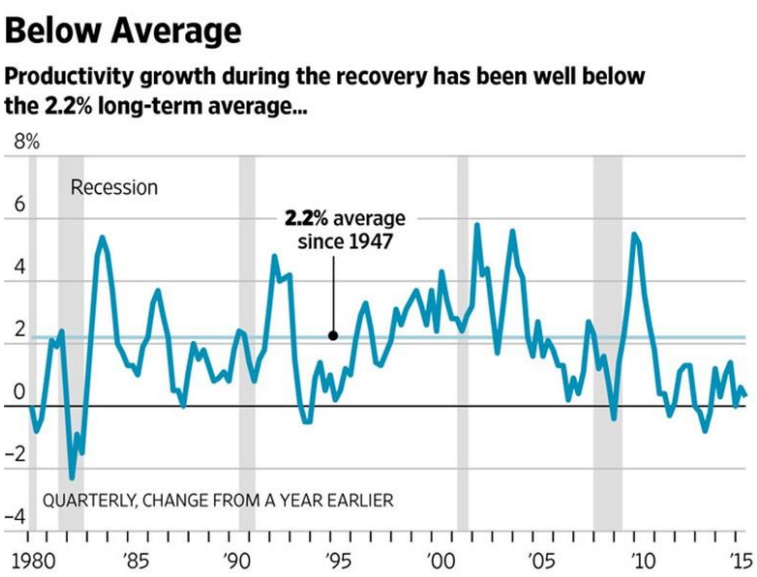
On the bigger economic stage, investors and economists are debating why U.S. economic performance since the Great Recession of 2008 has been so weak with fingers being pointed at various causes such as the decimation of the domestic housing industry, a lack of workers due to the growth in the number of those discouraged by the difficulty in finding a job, and social attitude changes toward energy consuming activities such as driving versus the use of public transportation, relying on technology options for traditional shopping and social interaction, and an aging population. One question being actively debated is how sustainable the current trend for young people to postpone formation of families is and whether that means the purchasing of vehicles and homes will be delayed. Family formations and vehicle miles traveled are both

rising calling into question the declarations that both trends would permanently lag their historical growth rates.

**On a year-over-year comparison, productivity rose by only 0.3%**

One consideration in understanding the slow growing economy is that America's productivity growth has severely lagged historical rates and that this weakness has contributed to the lagging output growth and will continue to limit future growth. The productivity of nonfarm workers, which is a measure of the output of goods and services per hour worked, grew at a 1.3% seasonally adjusted annual rate during 2015's second quarter. That gain follows consecutive quarterly declines. On a year-over-year comparison, productivity rose by only 0.3%. Despite the positive improvement in recent productivity measures, the gain is well below the long-term average of 2.2% per year since the end of World War II.

**Exhibit 3. Low Productivity Growth Remains A Mystery**




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

**The revised data showed that the initial productivity estimates were too high**

One of the more discouraging announcements was the Labor Department's recent revisions of the labor productivity data. For almost every quarter during the past three years, the revised data showed that the initial productivity estimates were too high. Understanding this trend has challenged economists and policymakers who are striving to find actions to accelerate the growth. For those dependent on a robust economy for the success of their businesses – consider the energy impact – the lack of answers is hurting efforts to plan and execute growth strategies.

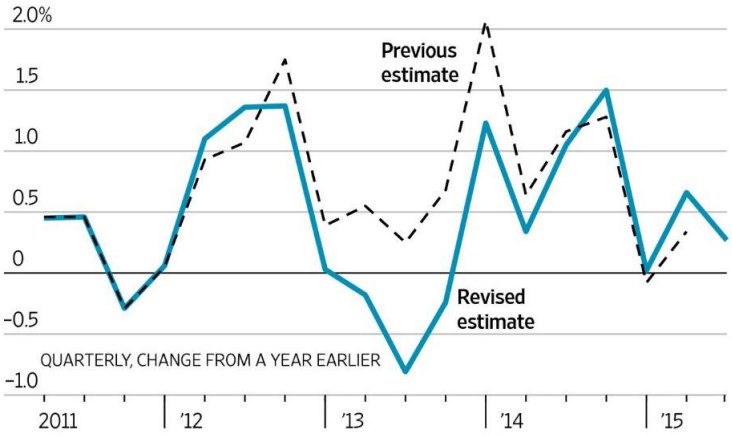
Just as productivity is a key to the future growth of the American economy, identifying and understanding what underlies the efficiency gains within the oil and gas industry is also frustrating energy company strategy planning. Efficiency is the term used to

**Efficiency is the term used to explain why U.S. oil and gas output continues to grow despite a dramatic reduction in the number of drilling rigs working**

explain why U.S. oil and gas output continues to grow despite a dramatic reduction in the number of drilling rigs working. As we examine the performance of the oil and gas industry, is becomes clearer that there are many factors that drive "efficiency gains" in drilling and production and mostly likely they are not all equally well developed. If we want to gain a better understanding of the state of the oil and gas industry's maturity in reaching peak efficiency, we need to both identify all the factors that might be at work and attempt to assess the state of their development. This effort can yield an answer to the question of how much longer the exploration and production (E&P) industry may potentially "get more while using less."

**Exhibit 4. Recent Weak Productivity Measure Revised Lower**

**...and recent readings have been weaker than first estimated.**




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

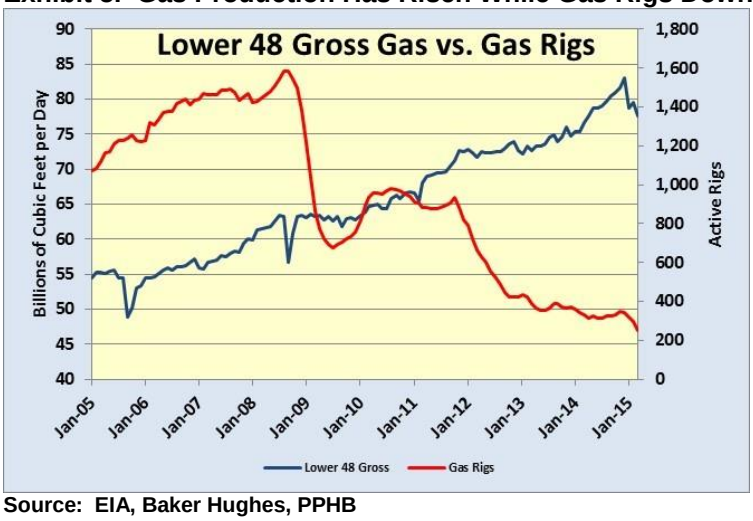
A list of factors impacting drilling and production efficiency would include the following: 1) identification of shale formations; 2) determining the "sweet spots" of shale formations; 3) improving the ability to drilling horizontally through shale formations; 4) improvements in the technology of hydraulic fracturing; 5) development of the re-fracturing process; 6) optimization of completing lateral sections of shale wells; 7) more accurate placement of infield wells; and, 8) improving drilling rig design and operation. While we believe this list of critical factors is complete, we acknowledge that we may have missed other factors, so we welcome any additions readers wish to propose.

**Operators began moving their gas-directed drilling rigs to areas with high gas-liquids content or to tight oil formations**

When natural gas prices dropped from double digit levels during the 2005 era into the high single-digit range that lasted through the 2009 recession, prices then collapsed to the $3 per thousand cubic feet level, which continues today. The drop in gas prices was associated with an unrelenting rise in gas output driven by the success of shale gas drilling. As a result, operators began moving their gas-directed drilling rigs to areas with high gas-liquids content or to tight oil

formations. As more drilling occurred in these formations, the natural gas drilling rig count continued falling but monthly gas production continued to climb steadily. It wasn't until the first quarter of this year that we saw a decline in Lower 48 initial gas output. This time, the production fall was matched by a reduction in the number of gas-oriented drilling rigs.

**Exhibit 5. Gas Production Has Risen While Gas Rigs Down**




**Source: EIA, Baker Hughes, PPHB**

During the early years of the shale revolution as gas production, the initial shale resource success, grew and the gas-oriented drilling rigs kept falling, analysts began dismissing the value of the rig count in predicting gas production. When the same phenomenon hit the oil shale and tight oil sector, analysts began spending much more time trying to assess the wells being drilled and the capability of drilling rigs to output more final wells in less time. Even Baker Hughes (BHI-NYSE), the dean of the drilling rig count, began publishing surveys of the number of wells being drilled in shale basins. The dynamics of shale wells – initial output, the decline rate and the economic ultimate recovery (EUR) - became much more important in attempting to assess the future for oil and gas supply rather than what was happening with the drilling rig count.

**The dynamics of shale wells – initial output, the decline rate and the ultimate economic recovery - became much more important in attempting to assess the future for oil and gas supply**

As a result of this shift in industry dynamics the Energy Information Administration (EIA) introduced a Drilling Productivity Report (DPR), which was designed to acknowledge the new drilling and producing technologies. Producers have continued to report meaningful reductions in the number of days needed to drill shale wells, which also impacts the cost of drilling the wells. The DPR focused on selected shale basins that were most important for predicting overall oil and gas production. The report measured the amount of oil and gas that was or is expected to be produced from new wells per average rig in a region for the current and following month. The report then assimilated data from the decline in production from legacy wells that would offset the increased production from the

**Producers have continued to report meaningful reductions in the number of days needed to drill shale wells, which also impacts the cost of drilling the wells**

estimated new wells. The purpose of the report was to try to forecast changes in oil and gas output for each of the important producing basins and, by extension, national output, also.

**Exhibit 6. Drilling Productivity Often Misses Trends**

| Year-Month | 14-Dec | 15-Jan | 15-Jan | 15-Feb | 15-Feb | 15-Mar | 15-Mar | 15-Apr | 15-Apr | 15-May | 15-May | 15-Jun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Crude oil from new wells - barrels per day* | | | | | | | | | | | | |
| Bakken | 543 | 550 | 555 | 563 | 563 | 575 | 577 | 592 | 592 | 610 | 610 | 631 |
| Eagle Ford | 550 | 558 | 558 | 566 | 651 | 660 | 660 | 680 | 680 | 700 | 700 | 720 |
| Haynesville | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 26 | 27 | 27 | 27 |
| Marcellus | 33 | 34 | 34 | 35 | 35 | 36 | 36 | 36 | 37 | 37 | 37 | 38 |
| Niobrara | 407 | 415 | 416 | 424 | 425 | 432 | 432 | 455 | 455 | 468 | 480 | 497 |
| Permian | 180 | 185 | 194 | 198 | 198 | 202 | 202 | 240 | 240 | 265 | 270 | 296 |
| Utica | 201 | 209 | 208 | 217 | 217 | 225 | 225 | 234 | 234 | 243 | 243 | 253 |
| **Total** | 1,938 | 1,975 | 1,989 | 2,027 | 2,113 | 2,154 | 2,156 | 2,261 | 2,264 | 2,350 | 2,367 | 2,462 |
| *Natural gas from new wells - thousand of cubic feet per day* | | | | | | | | | | | | |
| Bakken | 558 | 567 | 564 | 573 | 573 | 582 | 584 | 595 | 595 | 608 | 620 | 607 |
| Eagle Ford | 1,444 | 1,454 | 1,455 | 1,469 | 1,697 | 1,711 | 1,712 | 1,732 | 1,732 | 1,754 | 1,754 | 1,783 |
| Haynesville | 5,591 | 5,686 | 5,637 | 5,745 | 5,744 | 5,844 | 5,844 | 5,955 | 5,876 | 5,964 | 5,963 | 6,034 |
| Marcellus | 7,962 | 8,002 | 8,002 | 8,046 | 8,044 | 8,085 | 8,083 | 8,130 | 8,130 | 8,176 | 8,176 | 8,222 |
| Niobrara | 1,812 | 1,837 | 1,831 | 1,858 | 1,858 | 1,881 | 1,881 | 1,906 | 1,846 | 1,865 | 1,865 | 1,884 |
| Permian | 380 | 385 | 390 | 396 | 396 | 402 | 402 | 459 | 459 | 498 | 501 | 543 |
| Utica | 4,246 | 4,344 | 4,348 | 4,480 | 4,480 | 4,603 | 4,603 | 4,738 | 4,738 | 4,870 | 6,386 | 6,650 |
| **Total** | 21,993 | 22,275 | 22,227 | 22,567 | 22,792 | 23,108 | 23,109 | 23,515 | 23,376 | 23,735 | 25,265 | 25,723 |

**Source: EIA, PPHB**

**When we focus on the oil output projections, note that the revisions are primarily in the Bakken, Niobrara and Permian**

Recognizing that the DPR employs both estimates and actual production data, albeit with a lag, there are often revisions to the forecasts in subsequent months. In Exhibit 6, we show the monthly production figure and the estimate for the following month. In the chart where there are two monthly columns, the first column reflects the production estimate from the prior month while the second column shows the actual/revision, which becomes the base for projecting the following month's output. We have highlighted in red positive monthly revisions with negative revisions in green. When we focus on the oil output projections, note that the revisions are primarily in the Bakken, Niobrara and Permian. These are three important oil basins and the focus of intense interest for trying to understand why their output continues to rise.

**The most surprising upward revision was in May for the Utica basin**

For natural gas, the most frequent negative revisions are for Haynesville output followed by Marcellus and Niobrara. The most surprising upward revision was in May for the Utica basin, which may reflect that the EIA is now collecting more frequent and more encompassing data for the Utica. But we cannot ignore the fact that since late spring there have been several very large new wells reported by producers that may be influencing the data.

**It will also tell us something about what will happen to well service costs**

The DPR attempts to encompass many of the factors we listed above that influence drilling and production efficiency. We are planning to explore each of our listed factors to attempt to assess the state of their maturity, or whether we can expect the industry to be capable of growing output without requiring significantly more oilfield equipment than is currently being utilized. The answer to that question will tell us how the service sector will evolve during the rest of this cycle. It will also tell us something about what will happen to well service costs, which, in turn, will impact finding and

development costs for producers and their profitability, especially if oil and gas prices remain low.

## *AP* Study Hits California Green Energy Plan – Normal Result?

**We will ignore a politician who says it is too soon to assess the plan's effectiveness yet declare it is successful**

A recently completed study conducted by the *Associated Press* into the performance of California's Clean Energy Jobs Act showed that the money targeted to come into the state's coffers was arriving at a slower-than-anticipated rate. More than half the money spent by the program has gone to consultants and auditors. The board created to oversee the plan has yet to meet after three years. Lastly, only 15% of the annual job creation target has been achieved over the three-year period the law has been in effect. California Senate President Pro Tem Kevin de Leon, (Los Angeles – Democrat) who lead the push to enact Proposition 39 in 2012, which passed overwhelming, says the plan is already successful and it is too soon to assess its effectiveness. We will ignore a politician who says it is too soon to assess the plan's effectiveness yet declare it is successful. The plan was backed by billionaire investor and green energy promoter Tom Steyer, who funded the initiative campaign with $30 million and agrees with Sen. De Leon's assessment.

**The fund received only $381 million in 2013, $279 million in 2014 and $313 million in 2015, or slightly less than 60% of the targeted income**

According to the *AP*, the proponents of the plan told voters in 2012 that it would send up to $550 million annually to the Clean Jobs Energy Fund. The revenue was to come from closing a tax loophole for multistate corporations. So far, however, the fund received only $381 million in 2013, $279 million in 2014 and $313 million in 2015, or slightly less than 60% of the targeted income. As we often find with tax levies, individuals and corporations reorganize their financial affairs to satisfy the requirement to pay the least amount of taxes mandated as expressly allowed by Justice Learned Hand in 1934.

**The savings are estimated at $1.4 million a year, which suggests a nine year payback on the investment**

So far, schools have only applied for half of the $973 million of funds available. Of the $297 million given to schools to date, $153 million has gone for energy planning by consultants and auditors. Many of the projects being focused on are related to improving lighting within schools. The reason these projects are targeted is that they work well with the Energy Commission's formula, which requires schools to save at least $1.05 on energy costs for every dollar spent on the project. A series of projects highlighted by the *AP* are in the Los Angeles Unified School District. They would cost $12.6 million and involve lighting retrofits and heating and cooling upgrades. The savings are estimated at $1.4 million a year, which suggests a nine year payback on the investment. As of last week, no construction work has been done on any school site.

The goal of these construction programs is to create jobs. When the California Legislature created the fund by sending it half the money it anticipated collecting from the tax law change, it promised to generate more than 11,000 jobs each year. The record so far is the creation of 1,700 jobs over the three years the fund has been in

existence. Possibly more troubling is the revelation that the Energy Commission, which oversees Proposition 39 spending, could not provide any data about completed projects or calculate energy savings because schools are not required to report the results for up to 15 months after completion of projects. California school district officials report that they intend to meet the 2018 deadline to request funds and a 2020 deadline to complete projects. Any money from the fund not spent on school energy projects would be sent to California's general fund for the use of lawmakers on other projects.

**The record so far is the creation of 1,700 jobs over the three years the fund has been in existence**

**California school district officials report that they intend to meet the 2018 deadline to request funds**

The *AP's* study's results, along with the defense of the poor results of Proposition 39's tax law changes and the energy spending so far by the bill's proponents, came shortly after a new study was released claiming that Governor Jerry Brown's new renewable energy target proposed in his inaugural address in January and being enacted by the California Legislature could result in as much as $51 billion in annual savings for the state's residents. The study was prepared by Strategen Consulting and "quantifies the economic and societal impacts" of the governor's proposed goals.

The goal of Gov. Brown's renewable energy plan is to increase from 33% to 50% the proportion of the state's electricity generated from renewable sources. It also requires reducing petroleum use in cars and trucks by up to 50%. Lastly, the plan anticipates doubling the efficiency of existing buildings and making heating fuels cleaner.

**According to Strategen's analysis, it sees $51 billion in annual savings from 2030 on, or $4,000 per household each year**

According to Strategen's analysis, it sees $51 billion in annual savings from 2030 onward, or $4,000 per household each year. The consultants also see carbon emissions dropping by over 102 million tons per year, a reduction of 42% from 2015's level, the equivalent to planting a forest the size of Maine. There should be 739 fewer deaths each year due to the emissions reductions. They also see the creation of 1.2 million job-years by 2030, including 870,000 job-years in the wind and solar industries, up from 44,700 today. Lastly, they believe these steps will significantly decrease residents' vulnerability to volatile fossil fuel prices. That will come from enhanced grid efficiency, reliability and resiliency, which is achieved by the increased use of renewables backed by energy storage.

The founder and managing partner of Strategen Consulting, Janice Lin, was quoted saying, "We already have the advanced technologies and technical capabilities, which when combined with legislative and regulatory support and backed by forward-thinking investors, will propel California to a global leadership position in energy sustainability and independence."

**The study's authors believe that many of these technologies are available today**

The study says that by taking advantage of "innovative grid strategies and technologies" the state could craft regulatory policies that would realize Gov. Brown's plan. The study's authors believe that many of these technologies are available today and that they are rapidly descending the cost curve. They point to technologies

such as solar power, energy storage, wind energy, LED lighting and electric vehicles as among the technologies that will drive the state's economy to this nirvana.

**California's residents pay 17.35 c/kWh for their electricity, or 34.3% more than the national average of 12.95 c/kWh**

Interestingly, according to the Energy Information Administration's (EIA) July Electric Power Monthly, the average retail price of electricity to ultimate customers by end-use sector shows what the green energy mandates of California have done to its residents and businesses. The data for May 2015, the latest available, measured by cents per kilowatt-hour (c/kWh), shows that California's residents pay 17.35 c/kWh for their electricity, or 34.3% more than the national average of 12.95 c/kWh. The national average includes the high-cost electricity states of Alaska and Hawaii where costs are slightly over 20 and 30 c/kWh, respectively. It should also be noted that over the past year, the cost of electricity for California residents increased by 5.2% versus a national average that rose 0.8%. If you are a business or industrial user of electricity in California, your May power cost was 42.0% or 64.1%, respectively, above the national average for the category. We suspect power costs in California are going nowhere but up given the mandates in this clean energy plan. What will be the cost for California's residents and economy? We put Strategen's claim of a $4,000-per-family savings in 2030 in the same category as the $2,500 per family savings from Obamacare.

**The study found that the projected energy savings were 2.5 times greater than actual energy savings**

We were also intrigued to read about an energy study conducted by the University of Chicago dealing with home energy-efficiency measures. This particular study used data from a random sample of 30,000 low-income Michigan households that were eligible for an U.S. Energy Department home weatherization program. The study found that the projected energy savings were 2.5 times greater than actual energy savings. That means the people's energy bills declined but the savings did not equal the cost of the initial upgrades. Critics of the study suggest that it hadn't been peer-reviewed, but more importantly, they questioned the broad conclusions based on the results from one state and one target socio-economic group. However, the authors of the study are completing a similar study of middle-income homes in Wisconsin and finding similar results to the Michigan study. The conclusions of these studies call into question government programs for making existing homes and businesses more energy-efficient that are touted as among the cheapest and easiest ways to reduce emissions.

**He pointed out that there are other benefits from the program that homeowners receive**

The executive director of the American Council for an Energy-Efficient Economy said that weatherization programs for low-income households are among the least cost-effective energy efficiency measures. However, he pointed out that there are other benefits from the program that homeowners receive such as lower maintenance bills, reducing the likelihood of missed utility payments and a more comfortable home. We guess that these unquantifiable benefits outweigh the stark economic comparison showing costs being 150% more than the benefits.

**It appears that the engineering models that predict how much energy will actually be saved from the winterization steps are wildly over-optimistic**

Another popular explanation for why financial returns from weatherization programs isn't as great is due to energy consumption in homes that have been weatherized. The experts believe the homeowners of these weatherized homes use more energy because it costs less. The study's authors examined this "rebound" effect by comparing temperatures and thermostat settings in homes that were improved compared to those that were not, and found there to be no statistical difference. It appears that the engineering models that predict how much energy will actually be saved from the winterization steps are wildly over-optimistic. This conclusion should not be a surprise.

**"…let's count up the figures after the work is done."**

Mr. Steyer responded to a Wall Street Journal editorial on the AP report of Proposition 39's results in which he said, "…let's count up the figures after the work is done." As a successful hedge fund manager, we doubt Mr. Steyer would have waited for a decade to see the results of the managements he backed, nor would he have accepted his own response on the plan's results. Ideological devotion blinds people to what they demand elsewhere.

## How Might The Godzilla Of El Niño Impact Winter Weather?

**If you are counting on a cold and snowy winter such as recently forecast by the *Old Farmer's Almanac*, you could be surprised!**

For the energy business, 2015 is turning into one of the worst years in recent memory. The outlook doesn't appear to be improving much at the present time, but many analysts remain optimistic that conditions will change by the end of the year. Those hopes may be about to receive a blow if the meteorologists are correct about the formation of a "Godzilla of an El Niño" in the South Pacific. El Niño events are associated with altered normal weather patterns across the globe – the question is how those patterns may be altered. In this case, the meteorologists expect this year's El Niño will rival the last major one in 1997-1998. If you are counting on a cold and snowy winter such as recently forecast by the *Old Farmer's Almanac*, you could be surprised! What would that mean for natural gas demand and prices?

**The editors acknowledge that their greatest errors last winter were in underestimating how far above normal California temperatures and Boston-area snowfalls would be, although it did predict that both trends would be above normal**

Although the printed version of the almanac, believed to be the oldest continuously published periodical in North America and 26 years older than its closest competitor, *The Farmers' Almanac*, is just now being released, its weather predictions were announced in an earlier press release. The *Old Farmer's Almanac* utilizes a forecasting formula for predicting winter weather that was developed by its original editor Robert B. Thomas in 1792. The formula utilizes solar cycles, climatology and meteorology. The forecasts emphasize how much temperatures and precipitation will deviate from 30-year averages compiled and released by the federal government. The almanac claims to have an 80% success rate in forecasting the winter weather but as the media is quick to point out it didn't correctly predict the massive snowfall that buried Boston nor the warm temperatures in California last winter. The editors acknowledge that their greatest errors last winter were in

underestimating how far above normal California temperatures and Boston-area snowfalls would be, although it did predict that both trends would be above normal.

**This winter, according to the *Old Farmer's Almanac*, looks to have above-normal snow and below-normal temperatures for much of New England**

In a nutshell, this winter, according to the *Old Farmer's Almanac*, looks to have above-normal snow and below-normal temperatures for much of New England. It calls for icy conditions in parts of the South and frigid weather in the Midwest, and for the Pacific Northwest, the almanac expects the snowiest periods to be in mid-December, early to mid-January and mid to late February. For California, the outlook anticipates above-normal rainfall during the first half of the winter but then it expects the drought to resume. If one believes the *Old Farmer's Almanac* predictions, then many people should prepare for repeats of the photo in Exhibit 7 of a runner jogging in New York's Central Park last February.

**Exhibit 7. Another Snowy And Cold Winter In Store?**

**Source:** ***Associated Press***

**The Old Farmer's Almanac winter forecast suggests that winter energy demand will be solid, although maybe not quite as strong as experienced last winter**

The *Old Farmer's Almanac* winter forecast suggests that winter energy demand will be solid, although maybe not quite as strong as experienced last winter. For natural gas producers this suggests they should receive higher product prices. If natural gas supply growth stops climbing then maybe prices will rise higher, especially if more natural gas is used for generating electricity in response to the shutting down of coal-fired power plants and nuclear facilities, especially in New England. On the other hand, a recent release by the National Oceanic and Atmospheric Administration (NOAA) suggests that it is monitoring a very large El Niño this fall or winter. NOAA has been pointing out for a while that water temperatures in the South Pacific have been warming significantly leading to the conclusion that such a weather event might form. That is because water temperatures have warmed so quickly and to such a degree that they rival or possibly exceed those seen since 1997, which was when we experienced the strongest El Niño and warmest weather in recent years. A strong El Niño could mean much-needed rain for California, but also drought conditions for Australia and Southeast

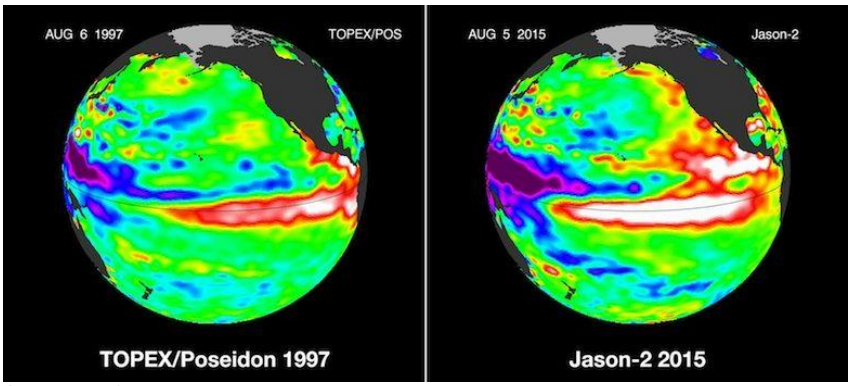
**The weather pattern could create a warmer winter in North America**

Asia along with floods for Peru. The weather pattern could also create a warmer winter in North America but fewer hurricanes this fall in the Atlantic Basin.

**This weather phenomenon occurs irregularly in the eastern Pacific Ocean every two to seven years**

How does an El Niño impact the globe's weather? This weather phenomenon occurs irregularly in the eastern Pacific Ocean every two to seven years. The trade winds usually blow warm ocean water from east to west where it piles up near Indonesia. Back east along the South American coast, cold water rises from deep depths to the surface cooling the area around Peru. In normal conditions, the sea levels are about 18-inches higher near Indonesia than they

**Exhibit 8. El Niño Forms In South Pacific**

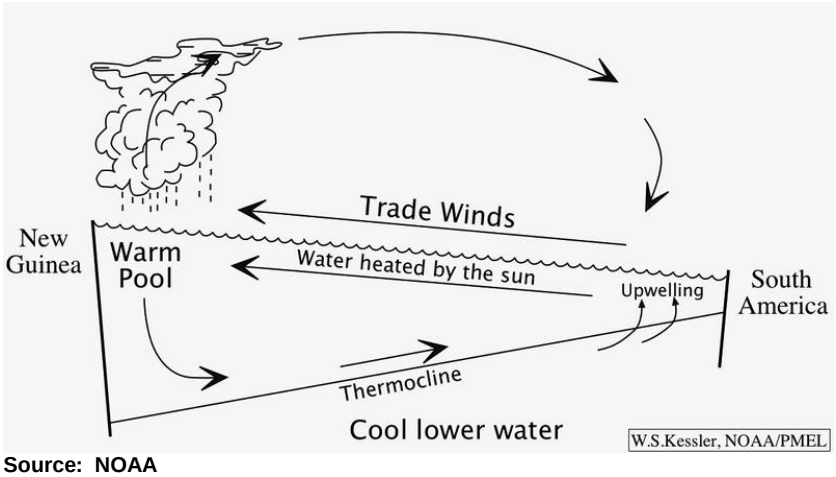



**Source: NOAA**

**That temperature difference creates a convective loop in the atmosphere that reinforces the trade winds**

are off Peru. In addition, the water temperature near Indonesia is about 8ºC (14.4ºF) warmer than near Peru. That temperature difference creates a convective loop in the atmosphere that reinforces the trade winds. The warm waters near Indonesia cause the air above it to rise, creating rainfall in the region, but importantly re-shaping jet streams guiding weather and storms across the globe.

**Exhibit 9. The Normal South Pacific Ocean Weather Pattern**

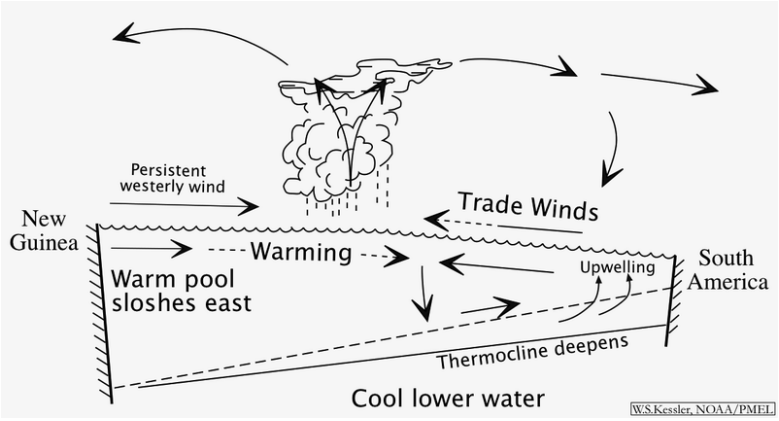



**Source: NOAA**

**Rainfall starts following the pool of warm water moving from Indonesia toward Peru, which explains why Southeast Asia becomes drier and Peru and the western United States wetter**

El Niño is born from a weakening (unexplained by meteorologists) of the trade winds that allows the warm water piled up near Indonesia to flow back east due to gravity. As the warmer water begins moving eastward there is less cold water rising off the coast of Peru. As a result, the waters off Peru begin warming, which further weakens the trade winds. At the same time, rainfall starts following the pool of warm water moving from Indonesia toward Peru, which explains why Southeast Asia becomes drier and Peru and the western United States wetter.

**Exhibit 10. How El Niño Alters Global Weather Patterns**




**Source: NOAA**

**Strong El Niño events usually bring rain to California as in 1982-1983, but occasionally they don't such as in 1965-1966**

While much about the currently developing El Niño is uncertain, one fact remains true. The weather impacts from this weather pattern will vary! For example, strong El Niño events usually bring rain to California as in 1982-1983, but occasionally they don't such as in 1965-1966. So those meteorologists who base their forecasts on a strong El Niño could get their forecasts wrong, something not unique to weather forecasting, which makes broad generalizations about our knowledge of climate's workings dangerous.

**El Niño tends to boost the economies of Argentina, Canada, Mexico and the United States, at least in the very short term**

One of the more interesting studies of the impact of El Niño comes from a team of scientists at the University of Cambridge and the International Monetary Fund who found on average, the weather pattern hurt economic activity in Australia, Chile, Indonesia, India, Japan, New Zealand and South Africa. The study, "Fair Weather or Foul? The Macroeconomic Effects of El Niño," attempted to measure the impact on economies based largely on agricultural, labor and trade measures for 21 countries and one grouping representing all of Europe. The reasons for the negative impacts identified varied, but they included drought and reduced crop yields in Australia and India, forest fires in Indonesia and less-productive fisheries offshore Peru. To the contrary, El Niño tends to boost the economies of Argentina, Canada, Mexico and the United States, at least in the very short term. We would be cautious about blindly assuming the pain and gain suggested for various economies across the globe due to the El Niño event. The table in Exhibit 11 shows a

wide range of economies the study identified as being impacted by the weather pattern. Given that there are so many variables as work in each economy it is difficult to attribute the proportion of the countries' positive or negative growth due to El Niño.

**Exhibit 11. How El Niño Impacts Global Economies**

**Table 3: The Effects of an El Niño Shock on Real GDP Growth (in percent)**

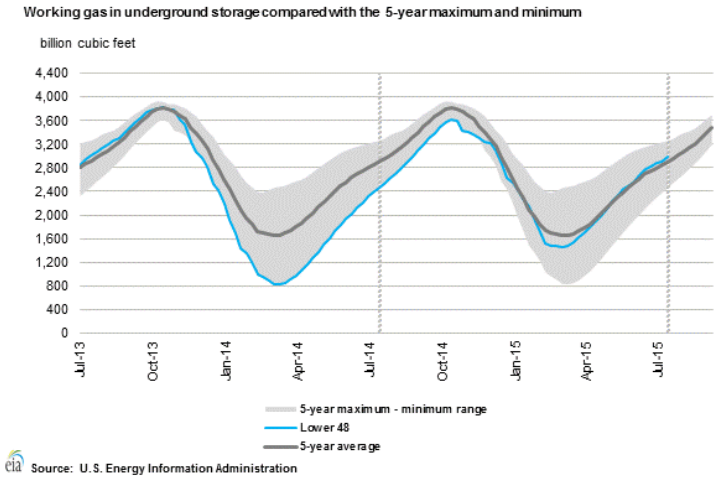
| Country | Impact | Cumulated Responses After | | | |
|---|---|---|---|---|---|
| | | 1 Quarter | 2 Quarters | 3 Quarters | 4 Quarters |
| Argentina | -0.08 | 0.03 | 0.29* | 0.64** | 1.08** |
| Australia | -0.03 | -0.18** | -0.30** | -0.37* | -0.41 |
| Brazil | -0.06 | 0.04 | 0.20 | 0.42* | 0.68* |
| Canada | 0.00 | 0.13** | 0.33* | 0.58** | 0.85** |
| China | -0.01 | 0.03 | 0.16* | 0.36* | 0.56* |
| Chile | -0.19* | -0.10 | 0.16* | 0.42* | 0.70* |
| Europe | 0.02 | 0.09 | 0.27** | 0.49** | 0.69** |
| India | -0.03 | -0.15* | -0.23 | -0.25 | -0.25 |
| Indonesia | -0.35** | -0.61* | -0.91* | -1.02 | -1.01 |
| Japan | -0.10* | -0.12 | 0.01* | 0.20* | 0.37* |
| Korea | 0.11 | 0.29* | 0.44 | 0.58 | 0.67 |
| Malaysia | 0.08 | 0.06 | 0.13 | 0.27 | 0.43 |
| Mexico | 0.03 | 0.37** | 0.71* | 1.12* | 1.57** |
| New Zealand | -0.16** | -0.29* | -0.37 | -0.42 | -0.43 |
| Peru | -0.07 | -0.28 | -0.35 | -0.34 | -0.33 |
| Philippines | 0.06 | 0.09 | 0.11 | 0.17 | 0.21 |
| South Africa | -0.11** | -0.24* | -0.47** | -0.63* | -0.72 |
| Saudi Arabia | -0.09 | -0.17 | -0.14 | 0.00 | 0.18 |
| Singapore | 0.09 | 0.28* | 0.54* | 0.87* | 1.18* |
| Thailand | 0.47** | 0.78** | 1.11** | 1.49** | 1.81** |
| USA | 0.05* | 0.10 | 0.23* | 0.39* | 0.55* |

**Source: Cashin, Univ. of Cambridge**

**So will the winter of 2015-2016 bring another bout of snow and cold or will a super El Niño produce a warmer winter?**

So will the winter of 2015-2016 bring another bout of snow and cold or will a super El Niño produce a warmer winter? After updating our model for the amount of natural gas that may be in storage at the start of the winter withdrawal season, we found that the past four weeks have seen gas injections falling below the average of the earlier portion of the summer. Early on in the season, we averaged 88 billion cubic feet (Bcf) of gas. That average slipped to 86 Bcf and after the past four weeks – 19 for the entire year-to-date – the weekly average has slipped to 79 Bcf. Assuming that the remainder of the injection season matches the weekly injections experienced in either 2009 or 2010, the industry should end the injection season with between 3.6 trillion cubic feet (Tcf) to 3.8 Tcf of gas in storage. While that volume is less than the 4 Tcf that was projected earlier, we still believe storage volumes will be sufficient to meet residential, business and power generation needs. The storage volume is in the upper half of the 5-year minimum/maximum range having begun outperforming the 5-year average several weeks ago.

**Exhibit 12. Natural Gas Storage Should Be Adequate**




**Source: EIA**

**Hang on as the next several months may prove quite interesting for natural gas markets**

If El Niño turns out to be as strong as suggested by the Godzilla designation, then it is possible that the potential for a large gas storage volume at the end of the winter might lead to weaker natural gas prices early in 2016 and possibly for longer. Of course, if the *Old Farmer's Almanac's* winter weather forecast proves more accurate, then natural gas prices should be in the $3.25-$3.50 per thousand cubic feet range, or possibly even higher, early next year. Hang on as the next several months may prove quite interesting for natural gas markets.

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