
MUSINGS FROM THE OIL PATCH

September 3, 2013

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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

Access To Capital Reshaping Structure Of Energy Business

Eventually, however, the investment returns must be generated or a new business plan becomes imperative

Many people are familiar with Richard Branson's, the founder of Virgin Airlines, comment that "the way to become a millionaire is to start as a billionaire and start an airline." While the quote produces lots of chuckles, it points out that in capital intensive industries, having large amounts of capital, or access to large capital pools is critical for success. It allows for significant investment and provides the cushion against periods when investment returns fail to generate sufficient income. Eventually, however, the investment returns must be generated or a new business plan becomes imperative. The development of the American shale revolution is a classic example of those trends at work and how capital and the sources of new capital can significantly alter the structure of the E&P industry.

The success of Mitchell Energy in exploiting the shale gas resource ultimately convinced other astute and visionary explorers to follow

As we consider how the American shale energy business has evolved since those early days of the late 1980s when George Mitchell and his management team struggled to find the keys for unlocking the natural gas trapped in the Barnett shale formation in North Central Texas, it becomes clear that the industry's structure is entering an accelerating change phase. Mr. Mitchell, ever the entrepreneur and visionary, sought help and money from many quarters including investors, clients, oilfield service companies and the federal government in order to fund his research efforts and the necessary well tests of the technologies that ultimately combined to produce commercially-viable volumes of Barnett shale gas. The success of Mitchell Energy & Development Company, Mr. Mitchell's company, in exploiting the shale gas resource ultimately convinced other astute and visionary explorers to follow. Each of the early players in the shale gas game contributed to the industry's collective knowledge of how drilling and completion techniques and improvements to these techniques could unlock the trapped gas. Due to low gas prices, this effort failed to create a financial windfall.

In 2002, Devon paid \$3.2 billion to acquire Mitchell Energy with the goal of matching its growing expertise in horizontal drilling applications with Mitchell's hydraulic fracturing and completions expertise

This key to industry riches – the great land grab – was embraced by investors who were willing to throw money at E&P companies who could show that they had staked out prime acreage in shale formations

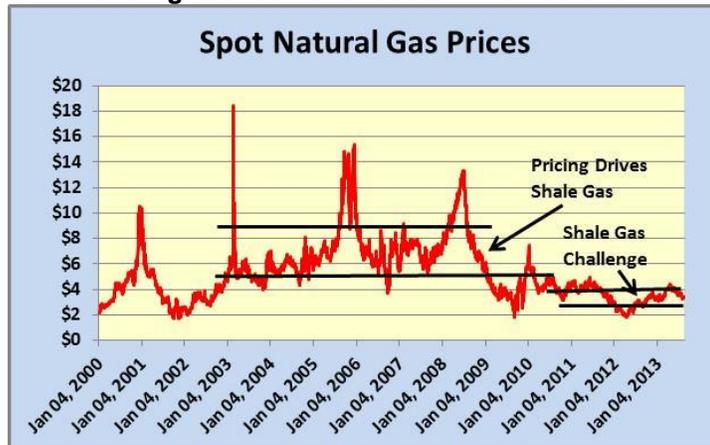
A combination of problems contributed to an unraveling of the shale revolution

It took Mitchell Energy nearly 20 years to figure out the secret to unlocking this gas resource, but the success was acknowledged by others, in particular Devon Energy Corp. (DVN-NYSE) run by the Nichols family of Oklahoma City. In 2002, Devon paid \$3.2 billion to acquire Mitchell Energy with the goal of matching its growing expertise in horizontal drilling applications with Mitchell's hydraulic fracturing and completions expertise to boost production not only from the Barnett formation but also to begin exploiting shale formations elsewhere. Although the shale revolution was well underway by 2002, the Mitchell Energy purchase highlighted the potential for this technology to open up new natural gas resources at a time when the outlook for U.S. gas supply was dependent on increased Canadian pipeline imports and more liquefied natural gas (LNG) shipments from the Middle East, Africa and Trinidad.

During the early 2000s, the shale revolution was driven by independent exploration and production companies who relied on internally generated cash flows supplemented by occasionally tapping public capital markets when available. Given the relatively high price of natural gas in the early years of this century due to domestic supply constraints, along with healthy oil prices, E&P company cash flows were reasonably adequate. However, as the industry had convinced Wall Street investors that the key to success in the gas shale business was to stockpile acreage in shale basins, companies needed money. The argument was that the nature of gas shale formations was fairly uniform, therefore the risk of dry wells was minimal and thus would enable the drilling process to become the equivalent of a manufacturing operation – consistent well results in terms of initial well output and the volume of ultimately recoverable reserves attributed to each well. This key to industry riches – the great land grab – was embraced by investors who were willing to throw money at E&P companies who could show that they had staked out prime acreage in shale formations and needed the cash to begin converting the resource promise into revenues and earnings. This euphoric period encouraged E&P companies to seek new and presumably more prolific shale basins, often using some of the investors' money. Why not? The more acreage owned, the greater the pot of gold at the end of the rainbow. In fact, during the run up to 2010, it seemed that every new shale basin targeted by the leading gas shale producers was projected to become the nation's largest ever gas-producing basin.

A combination of problems contributed to an unraveling of the shale revolution. First came the collapse in natural gas prices caused by the twin problems of curtailed demand due to the 2008 financial crisis and subsequent recession along with the surge in gas output due to the sharp ramp-up in drilling activity driven by well commitments agreed to as part of the great land grab. Initially, these conditions were perceived to be little more than a bump in the road to financial riches for shale-oriented E&P companies. Surely cheap natural gas was going to capture a greater share of the

Exhibit 1. High Gas Prices Drove Shale Revolution

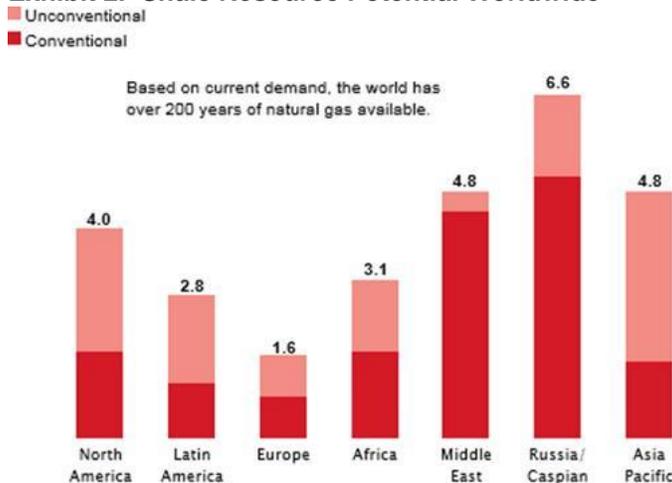


Source: EIA, PPHB

The natural gas industry had embarked on an aggressive PR effort to promote greater use of natural gas in this country

domestic energy market as the economy recovered. Besides, the natural gas industry had embarked on an aggressive PR effort to promote greater use of natural gas in this country, especially in the transportation sector. Producers also saw cheap gas, given the numerous projections that we had hundreds of years of potential supply, as a global competitive advantage that could be exploited through the export of surplus gas output to international markets who were conditioned to pay substantially higher prices than Americans were for their gas.

Exhibit 2. Shale Resource Potential Worldwide



Source: IEA

Source: ExxonMobil

As we moved toward the end of the first decade of this century, new capital markets players became involved in the shale revolution. They were mostly energy companies from outside the United States.

An emerging problem with the land grab was the discovery that shale formations might have similar geological characteristics of traditional gas formations

They were motivated, on the one hand, by the prospect that the shale revolution could become a global trend offering great riches to early players, and on the other hand by the opportunities offered due to the distressed financial condition of many domestic E&P companies. The drop in natural gas prices had undercut the optimistic profit forecasts for many E&P companies, especially for those who leveraged their balance sheets to score big in the land grab game. An emerging problem with the land grab was the discovery that shale formations might have similar geological characteristics of traditional gas formations, meaning that poor wells would become a part of the shale revolution.

A favorite deal structure was the joint venture

This period was marked by a surge in merger and acquisition activity involving major integrated oil and gas companies who had missed the early wave of the shale revolution and international integrated oil and gas companies seeking both access to gas resources and the knowledge about how to tap shale formations that might lie in their home countries. The range of deals was only limited by the creativity of investment bankers and the reluctance of producers to give up too much to the new providers of capital. A favorite deal structure was the joint venture where the provider of new capital agreed to fund E&P activity in return for a portion of the reserves developed. In these ventures, the domestic E&P companies retained the lion's share of the output and reserves and remained in control of drilling activity. New players were welcomed primarily for their money.

ExxonMobil's chairman, understood the potential the shale revolution could have on the energy business

In 2010 came the blockbuster deal when staid oil giant Exxon Mobil Corp. (XOM-NYSE) agreed to purchase independent producer XTO Resources for \$41 billion including the debt assumed (\$35 billion in value at the time of the closing), the second largest deal done by the company after its \$80 billion merger with Mobil in 1998. The backstory, as told in a *Fortune* article, was that Rex Tillerson, ExxonMobil's chairman, understood the potential the shale revolution could have on the energy business – both domestically and globally – and that he recognized his company was late to the party as most of the attractive acreage was already leased in the target basins. How did Mr. Tillerson gain this understanding, especially if his strategic planning department seemed to have missed it? It goes back to his early career with the company.

Mr. Tillerson learned much from his assignment and when he became CEO in 2006 he began to investigate the shale revolution

In his second assignment with Exxon, in 1976, Mr. Tillerson was sent to East Texas with the task of following around rigs drilling for natural gas and then overseeing completion of the wells. In this case, that meant experimenting with hydraulic fracturing. According to Mr. Tillerson's story, he would drive back to the company's district office in Tyler, Texas where he would put punch cards through the company's computer as he experimented with designing new well fracturing programs. Obviously, Mr. Tillerson learned much from his assignment and when he became CEO in 2006 he began to investigate the shale revolution. He formed a joint venture

After about a year, Mr. Tillerson sold the assets, but by then he had reached the conclusion about the significance of shale and how late ExxonMobil was to the play

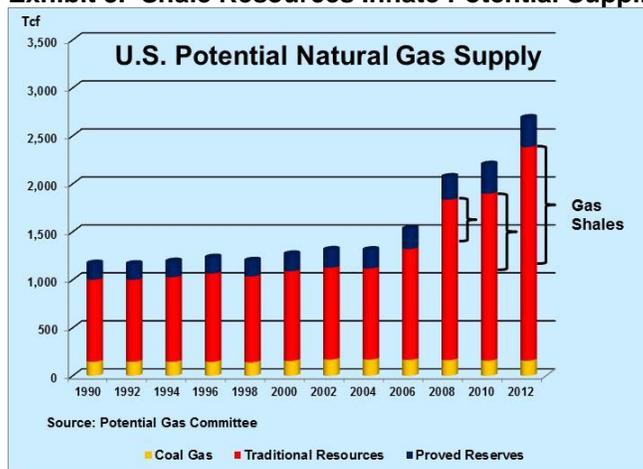
partnership with an independent driller and purchased acreage in the Barnett shale. The partner was directed to build a position in the formation, but the effort was to assist ExxonMobil in learning more. After about a year, Mr. Tillerson sold the assets, but by then he had reached the conclusion about the significance of shale and how late ExxonMobil was to the play. In 2009, Mr. Tillerson received a call from a banker friend with whom he had been in the University of Texas marching band. The banker was on the board of XTO Energy and indicated that its chairman was thinking about selling. XTO was a leader in the shale business and offered an excellent opportunity with appropriate scale, which is important for a company as large as ExxonMobil. An agreement was struck for an all-stock deal and for XTO management to take the lead for ExxonMobil in directing its foray into the shale business.

The studies suggested there were plenty of opportunities still available; it only took money and imagination, but not necessarily in that order

The shock of the ExxonMobil purchase reverberated throughout the energy industry and on Wall Street. If ExxonMobil was validating the shale revolution – along with its economic shift in focus from dry natural gas to liquids-rich gas and tight oil plays – then the cheapest entry point might be the purchase of highly-leveraged and financially-distressed E&P companies with substantial shale lease stakes. This force has helped reshape the face of the E&P industry.

Another ingredient in reshaping the industry was the entry of private equity firms in providing capital for E&P companies hoping to exploit their expertise in the shale business. (We'll come back to private equity below.) Following the lead of knowledgeable industry insiders along with the raft of studies emanating from energy consultants and Wall Street investment firms showing how the future of the U.S. energy industry, along with that of the global oil and gas business, had been changed dramatically, shale investing exploded. The studies suggested there were plenty of opportunities still available; it only took money and imagination, but not necessarily in that order.

Exhibit 3. Shale Resources Inflate Potential Supplies



Source: PGC, PPHB

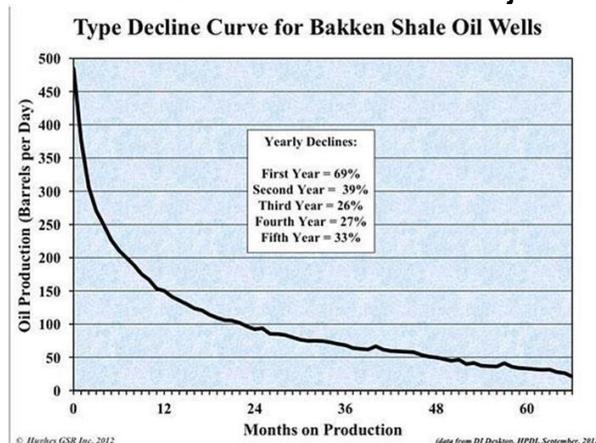
Over the past three years, it seems as if each research study and energy forecast became more bullish about the oil and gas outlook for America

As the Potential Gas Committee upped its estimates of the amount of technically-recoverable natural gas supply in the United States during 2008-2012, the thought that America might become energy independent, or at least that North America as an entity might achieve that goal, became a popular theme. Over the past three years, it seems as if each research study and energy forecast became more bullish about the oil and gas outlook for America. One research report even coined the term “Saudi America” to characterize how much the energy status of the United States had changed and how the country’s role in the global energy business would be altered. The industry’s success in growing domestic oil production from North Dakota’s Bakken and South Texas’ Eagle Ford shale formations has led to projections of the U.S. becoming a net oil exporter, even though it will take a change in laws to allow significant volumes of crude oil to be exported. The U.S. is projected to surpass Russia, and ultimately Saudi Arabia, in annual oil production by 2020. Most of these forecasts, however, come from economists and not geologists.

It is possible that the decline rate has been accelerated by the increased use of multi-stage well fracturing completion programs

The battle over the performance of shale reservoirs is still being waged with no clear outcome, yet. The preliminary data, however, suggests that the steep decline in production from shale wells has not been arrested by technology. In fact, it is possible that the decline rate has been accelerated by the increased use of multi-stage well fracturing completion programs. The thought is that the rapid production declines can be offset by drilling more wells in reservoirs in order to boost the recovery rate from low single-digit to low double-digit percentages. Recovering more of the trapped oil and gas can increase the ultimate recovery of reservoirs, but it may not boost the individual well productivity, meaning there will be a need to drill thousands of additional wells in order to sustain shale production at existing rates, let alone to grow output. That will be good for the oilfield service companies, but not necessarily good for the E&P companies who have to pay the bills.

Exhibit 4. Reservoir Performance Is Major Issue



Source: David Hughes

The production issues have impacted how fields will be drilled and completed in the future

The arrival of private equity firms to the party added a new force to sustain the shale revolution just when it looked to be faltering due to below-ground reservoir issues. The production issues have impacted how fields will be drilled and completed in the future. The idea of putting a drilling rig on a specially constructed pad that enables drilling up to 16 or more wells from one location rather than 16 separate locations enables the industry to only have to mobilize the drilling rig and cementing and fracturing units once, thereby improving field productivity and reducing expense. This is one way to improve the economics of shale exploitation. The rush by service companies to add new drilling rigs, pressure pumping equipment and other equipment to the domestic fleet to meet growing demand had the reverse effect of creating a huge oversupply of service capacity and driving down prices to the delight of E&P companies. This equipment expansion came from traditional service companies and newly formed or financed by private equity.

Just how did private equity become such an important factor in financing the shale revolution?

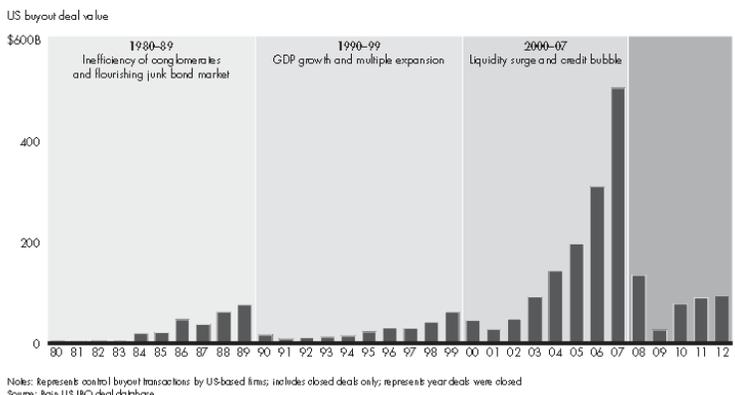
The private equity firms took advantage of this market turmoil to finance new management teams in start-up shale ventures or to back conventional E&P companies who were instructed to dump all their conventional production and prospects in favor of building 100% shale portfolios. This single purpose focus played to the investment community's mantra that shale exposure was all that mattered to be successful in raising money since shale was anointed as the key growth segment of the upstream oil and gas business. Just how did private equity become such an important factor in financing the shale revolution? It capitalized on studies showing that private equity investments had outperformed public equity markets in the past and therefore would continue to do so in the future. With that endorsement, it became easier for private equity firms to raise funds from institutional investors.

From these pioneers the private equity industry has mushroomed into nearly 1,500 funds with more on the horizon

The private equity business – the buying, running and selling companies – has been around almost forever. For centuries, private equity was the purview of wealthy individuals and families. In America, we are acquainted with the names of Mellon, J.P. Morgan, the Rockefeller family and Jay Cooke who built substantial companies and industries. In Europe, people such as Eric M. Warburg (Warburg Pincus), and the leaders of the Scottish Trusts were all instrumental in successful private equity investments. The private equity business as it is known today had its roots in the creation of two companies in 1946 – American Research and Development Corporation and J.H. Whitney & Company. From these pioneers the private equity industry has mushroomed into nearly 1,500 funds with more on the horizon. Private equity as an investment asset class has been recognized for about 30-35 years and it has grown in importance as public and private pension fund assets grew. Several important studies about diversified portfolios, plus the huge success of the Yale and Harvard University endowment funds with their alternative investments, including private equity, further helped the sector to grow and expand.

Exhibit 5. Recent History Of Private Equity Industry

Figure 1.1: The private equity business is cyclical, but it is unclear what will propel the industry forward in the next cycle



Source: Bain and Co.

An April 2013 study prepared by Robert S. Harris of the University of Virginia, Darden School of Business, Tim Jenkinson of the Said Business School, University of Oxford and Center for Economic and Policy Research, and Steven N. Kaplan of the University of Chicago, Booth School of Business and the National Bureau of Economic Research, entitled, “Private Equity Performance: What Do We Know?” examined the performance of 1,400 private equity funds – buyout and venture capital. The study utilized data from the business that manages the paperwork for over 200 institutions invested in these funds. The study also compared its results against those from other private databases.

“Our estimates imply that each dollar invested in the average fund returned at least 20% more than a dollar invested in the S&P 500”

The study’s primary conclusion was: “First, it seems likely that buyout funds have outperformed public markets, net of fees and carried interest, in the 1980s, 1990s, and 2000s. Our estimates imply that each dollar invested in the average fund returned at least 20% more than a dollar invested in the S&P 500. This works out to an outperformance of at least 3% per year. These conclusions appear to be relatively insensitive to assumptions about benchmark indices and systematic risk. For the more recent and less fully realized vintage funds, however, the eventual performance will depend on the ultimate realization of their remaining investments. Our results (and those we estimate from the other commercial datasets) imply that buyout funds outperformed public markets much more substantially gross of fees. Nailing down the sources of this large outperformance seems a fruitful subject for future research.”

The ability of private equity managers to market this significant outperformance to institutional investors, the source of most new investment capital in this country, and likely globally, enhanced their ability to capture large pools of new capital to keep their enterprises in high gear. While these performance studies speak to all types of private equity funds, the fact that energy is now deemed to be a

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To compete, private equity funds must be prepared to write checks for \$500 million to \$1 billion to play the E&P game

The last time we saw so much money seeking a home in the energy business was in the early 1980s

growth industry after decades of being labeled a sunset business means funds focused on the sector will receive consideration.

To appreciate the scope of private equity and energy, we have been told that there may be as much as \$60 billion of capital on the sidelines seeking attractive investments in the energy industry. That's the equivalent of the combined market cap of Baker Hughes (BHI-NYSE) and Halliburton (HAL-NYSE) or alternatively, the value of EOG Resources (EOG-NYSE) and Devon Energy (DEV-NYSE), not an inconsequential amount of money. Additionally, we understand there may be as many as 500 global private equity funds holding energy investments in their portfolios. If these funds have made money with these investments, the funds are likely to be interested in finding other potential energy investments. With all this money, a successful investment track record and an optimistic outlook for energy, it is likely private equity will continue to reshape the energy business.

Private equity funds will adhere to the traditional methodology of buying undervalued enterprises – big and small – that can either be better managed or provided additional capital to accelerate growth by acquiring additional businesses or assets. Private equity funds will have to compete against industry buyers in their acquisition efforts, but they also could benefit from divestment of business units by established companies. During a recent private equity webinar, the point was made that in the upstream sector of energy, private equity is focusing on Gulf of Mexico assets and select international geomarkets. To compete, private equity funds must be prepared to write checks for \$500 million to \$1 billion to play the E&P game. This threshold will keep some funds from playing. As a result, private equity funds will look to other energy sectors - oilfield service companies with shale completion technologies or firms seeking to build out assets to be sold later to upstream and midstream Master Limited Partnerships, further restructuring the energy business.

We would be remiss if we failed to mention that the last time we saw so much money seeking a home in the energy business was in the early 1980s following the 1970s explosion in global oil prices and the belief that oil prices would continue to go up. Then, the U.S. tax code encouraged high income investors to invest in limited partnerships that were building new drilling rigs and offshore support vessels in order to capture high depreciation charges that could shelter their income from federal taxes. That strategy pushed too much capital into an industry that couldn't handle it and contributing to massive investment losses when industry fundamentals changed. It was this industry depression era that fostered the formation of the early energy buyout (private equity) funds such as First Reserve and EnCap. Could we be entering an industry investment phase similar to 1979-1985? We certainly hope not as history shows that the short-term fun of the boom ultimately created an extended period of long-term pain for many. Remember, this industry goes in cycles!

Keystone XL Pipeline Decision – Say Hello Goodbye

The landscape surrounding this decision is shaped by the Obama administration's desire to appease a powerful constituency

Anyone who thought the fate of the Keystone XL pipeline permit was about to be resolved needs to adjust their thinking. We are witnessing another chapter in the political drama over approving the permit to construct the northern leg of the Keystone pipeline, and that chapter revolves around the internal processes of the Department of State who is responsible for determining whether this pipeline is in the country's best interest. The landscape surrounding this decision is shaped by the Obama administration's desire to appease a powerful constituency within the Democratic Party and a staunch supporter of President Barack Obama's election while engaging in a game of charades that make it appear that a positive decision is at hand.

The result of this investigation is that any Keystone decision may be delayed until early 2014

This latest chapter in the saga began with a report of an investigation by the State Department's inspector general of the selection of the environmental consulting firm that prepared the report on the pipeline. The concern is that the firm is conflicted because it has performed work on other TransCanada Corp. (TRP-NYSE) pipeline projects. The result of this investigation is that any Keystone decision may be delayed until early 2014. The investigation of Environmental Resources Management, the third-party firm hired by the State Department to prepare the draft of the required Supplemental Environmental Impact Statement (SEIS) assessing the risks of building the pipeline, for possible conflict of interests follows on a similar investigation of the environmental contractor hired for the initial Environmental Impact Statement (EIS) for the first permit application in 2010. Cardno Entrix was the environmental firm hired by the State Department to prepare the EIS for the application that was eventually derailed by the President's decision that the State Department couldn't meet an accelerated approval process mandated by Congressional action. In that investigation, the inspector general concluded that the State Department had not followed its own process for investigating and hiring the consultant.

TransCanada only provided a list of qualified firms to the State Department who made the final selection

Based on our knowledge of the State Department hiring process for consulting firms and the fact the inspector general has already outlined mistakes in the prior process, one has to wonder what game is being played by the government. There are two key considerations about the hiring of environmental consultants: 1) there are very few firms qualified to opine about the environmental impact of pipeline construction projects, and 2) TransCanada only provided a list of qualified firms to the State Department who made the final selection. As one of the world's largest operator of oil and gas pipelines, it is highly likely that TransCanada has dealt with every one of the qualified environmental consulting firms, meaning it will have a potential conflict with any firm selected by the State Department. What we don't know is what the problems were with the first selection process, since the onus of uncovering any

Are we engaged in a pre-shot-clock-era game of “Four Corners Basketball” where the aim was to keep the ball away from the other team while running out the clock?

The fact that the existence of this letter was concealed for four months also has to make one wonder about the government’s games underway

Mr. Johnson’s comments point out that even if Keystone is approved, securing the construction permits will entail additional legal fights

potential conflict of interest and evaluating its significance in compromising the results of the study rests with State Department officials. If they were incompetent conducting the first hiring process, why are (were) they involved in this latest hiring process? Or maybe they aren’t (weren’t). We have no way of knowing. We’re beginning to wonder whether there are any competent employees in positions of authority within the State Department.

The earlier inspector general investigation of Cardno Entrix was performed relatively quickly. Why will this investigation take six or more months to be completed? Are we engaged in a pre-shot-clock-era game of “Four Corners Basketball” where the aim was to keep the ball away from the other team while running out the clock? TransCanada has already announced it will move forward with its Energy East pipeline project to convert an unused gas pipeline from Alberta to Quebec and then extend it to New Brunswick and the Irving refinery and export facilities.

Two other developments appear to signal problems for the Keystone permit application. First was the disclosure of changes in the Canadian government’s argument that the pipeline was critical for the expansion of oil sands output, an important economic objective. This change came following President Obama’s June climate change speech in which he laid out conditions for the approval of the Keystone pipeline application. The key condition is that the pipeline does not increase carbon emissions, which seemed to be what the draft SEIS concluded. The second issue was the recent disclosure of a letter to the State Department sent by the Department of the Interior pointing out concerns it has with the draft SEIS’s conclusions that there will be no impact on national parks, wildlife and waterways. Interior says that these concerns were expressed about the initial EIS’s conclusions but not resolved in the SEIS. The fact that the existence of this letter was concealed for four months also has to make one wonder about the government’s games underway.

An article in the *Huffington Post* on the Interior Department’s letter interviewed a former Interior employee about its significance and the complaints. “Craig Johnson, a retired biologist who worked at the Fish and Wildlife Service for 15 years, said the letter from Interior is a fairly standard response to this kind of analysis. But it does lay out the areas that are likely to be the top concern for the department should the Keystone XL pipeline get to the stage where it is seeking operating permits. ‘Most of these are placeholders for more detailed and often fairly intense fights during permitting,’ said Johnson. ‘This is the posturing before the fight.’” Mr. Johnson’s comments point out that even if Keystone is approved, securing the construction permits will entail additional legal fights, which will likely be led by the Interior Department. That legal quagmire will be further compounded by legal challenges from organizations such as the National Resource Defense Council and the Sierra Club, to name just a couple of activist environmental groups who have made

increased oil sands output a line in the sand. We repeat our view that Keystone will not be approved, but even if we are wrong and it is approved, we doubt it will be built as the legal battle will stretch the pipeline's possible start-up date well beyond its peak economic value. That conclusion fits with the recent statement of Continental Resources, Inc. (CLR-NYSE) CEO Harold Hamm that Keystone is "not critical any longer."

Energy Traders Should Love The *Farmers' Almanac* Outlook

Since early August, natural gas prices are up about \$0.20/Mcf

As we write this article, near-month natural gas futures prices are sitting at \$3.50 per thousand cubic feet (Mcf) of gas, having moved very little in recent weeks. Since early August, natural gas prices are up about \$0.20/Mcf due to more gas being consumed as a result of low gas prices stimulating greater electric utilities switching from coal to gas to fuel their plants. On the other hand, gas prices are down roughly \$0.25/Mcf from where they were six weeks ago during the extreme heat wave that swept from the Southwest up through the Midwest and then blanketed the East Coast boosting air conditioning usage and electricity demand.

The lack of Gulf of Mexico hurricane activity so far this year is swelling gas supply

Commodity traders are struggling to estimate how much natural gas will wind up in storage when the gas injection season ends in a matter of weeks and gas users begin buying for the upcoming winter. They know the estimate will impact gas prices and profitable trading opportunities. The lack of Gulf of Mexico hurricane activity so far this year is swelling gas supply, and with shale gas output growing, any future storm-related supply shut-ins will have minimal supply impact. This is just another way in which the shale revolution has altered the dynamics of the domestic gas business.

"For 2013–2014, we are forecasting a winter that will experience below average temperatures for about two-thirds of the nation"

We were amused to read a news story about the release of the 2014 *Farmers' Almanac*, which headlined its introduction with: "The 'Days of Shivery' are back!" The press release of this Maine-based publication quotes the *Almanac's* chief weather forecaster, Caleb Weatherbee, a pseudonym that has been passed down for generations, saying: "For 2013–2014, we are forecasting a winter that will experience below average temperatures for about two-thirds of the nation. A large area of below-normal temperatures will predominate from roughly east of the Continental Divide to the Appalachians, north and east through New England. Coldest temperatures will be over the Northern Plains on east into the Great Lakes." The magazine predicts that only the Far West and Southeast will have winter temperatures closer to normal.

On the topic of winter precipitation, the *Farmers' Almanac* has a chilling message. "With a combination of below-normal temperatures and above-normal precipitation the stage will be set for the Midwest, Great Lakes, and Central and Northern New England to receive lots of snow." It goes on to predict that with vacillating temperatures, "Southern New England, Southeast New York, New

Exhibit 6. The Shivery *Farmers'* Winter Forecast

Source: *Farmers' Almanac*

Almanac managing editor Sandi Duncan is already naming the upcoming Super Bowl XLVIII the “Storm Bowl”

“Let me state emphatically that no one – with any degree of accuracy – can predict the specific days when cold snaps or storms will occur months in advance”

Jersey, and down through the Mid-Atlantic region will be seeing either copious rains and/or snows.” The most outrageous forecast is that the Mid-Atlantic region is set for a huge snowstorm during the first few days of February, which coincides with the February 2nd date for the NFL’s Super Bowl to be held in the Meadowlands in New Jersey, which would be held in a cold weather, open-air stadium. *Almanac* managing editor Sandi Duncan is already naming the upcoming Super Bowl XLVIII the “Storm Bowl.”

One would have thought the 2013-2014 weather prediction would have sent natural gas futures prices higher with the prospect of COLD winter weather. But an article by Jason Samenow, the *Capital Weather Gang*’s chief meteorologist and who also serves as the *Washington Post*’s Weather Editor pokes holes in the forecast and points out how the *Farmers’ Almanac*’s winter weather forecast for last year was wrong. Mr. Samenow makes an interesting and definitive statement about the limitations of meteorology. He says, “Let me state emphatically that no one – with any degree of accuracy – can predict the specific days when cold snaps or storms will occur months in advance.” He acknowledges that the best meteorologists can do is predict whether a winter will be warmer or colder or wetter or drier than normal, but with only slightly better odds than by flipping a coin.

Exhibit 7. Last Winter's *Farmer's Almanac* Forecast

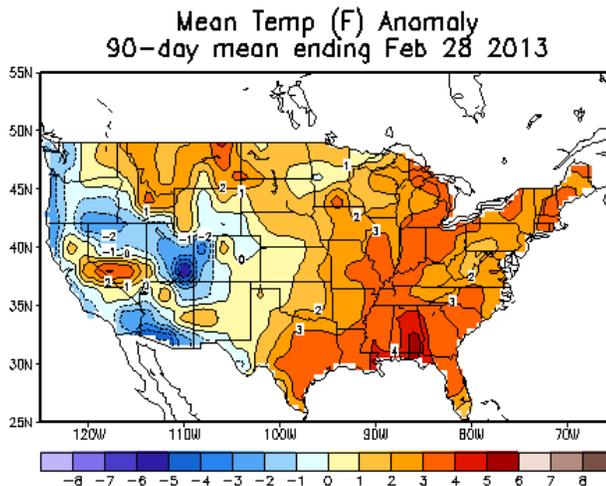


Source: *Farmers' Almanac*

Mr. Samenow saves his primary criticism for the *Farmer's Almanac's* claim for having successfully forecast last winter's weather

Mr. Samenow saves his primary criticism for the *Farmer's Almanac's* claim for having successfully forecast last winter's weather. That forecast called for cold weather in the East and mild weather in the West, but the opposite occurred as the eastern two-thirds of the U.S. had a milder than normal winter and it was cooler than average in parts of the West. Mr. Samenow's article contained a chart of mean average temperatures for the winter of 2012-2013 for the entire United States.

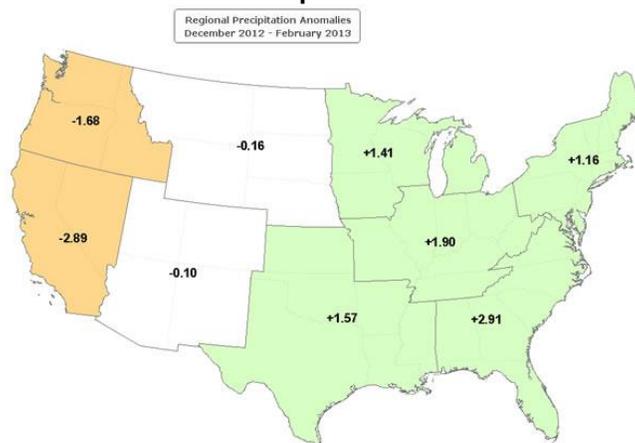
Exhibit 8. Actual Temperatures Were Reversed



Source: *Capital Weather Gang's* web site

The article also contained a chart showing the deviation from normal of precipitation over the continental U.S. last winter. Compared to its temperature forecast, last year's *Farmers' Almanac* predictions for snow and rain by region of the country were slightly better, although it got some specific details wrong.

Exhibit 9. 2012-13 Precipitation Forecast Was Closer



Source: *Capital Weather Gang's* web site

Mr. Samenow points out that stormy weather tends to hit the East Coast every 3-5 days during the winter, so predicting winter storms within a 1-3 day window is not particularly impressive, in his view

What Mr. Samenow really takes the *Almanac* to task for in their forecast and their critique of their last year's forecast is their trick of highlighting the dates for storms. He points out that the *Almanac* boasted that it "red-flagged the time frames for two winter storms that affected the East Coast by saying that these storms arrived only 1-3 days ahead of their forecasted dates. Mr. Samenow points out that stormy weather tends to hit the East Coast every 3-5 days during the winter, so predicting winter storms within a 1-3 day window is not particularly impressive, in his view. He further suggests that this is a trick the *Almanac* forecasters are using when they predict the storm for the 2014 Super Bowl. Since winter storms cycle through the region every few days and early February is historically a stormy period, Mr. Samenow doesn't think this is a forecasting stretch.

Mr. Samenow suggests that it is too early to be making a winter forecast. He says his organization will release its forecast around Halloween at the end of October when they have better feel for the forces that will impact winter weather trends. Maybe we should just wait for the release of the *2014 Old Farmers' Almanac* next month, the other iconic weather predictor. Did anyone say Ground Hog Day? Oh yes, that happens to be the date of the 2014 Super Bowl!

Rhode Island Wind Turbines Struggle For Relevance

Concerns have been expressed by residents of Narragansett, the proposed target landing point, about its impact on their beaches

The effort by Deepwater Wind to build its demonstration wind farm offshore Block Island continues to inch forward, but without having secured a deal for landing the cable that will bring excess power from the island to the Rhode Island mainland. We don't know the latest status of the cable, but a review of the news stories suggests there has been no progress. Concerns have been expressed by residents of Narragansett, the proposed target landing point, about its impact on their beaches. We're guessing it may be all about the

As Rick Wilson put it, “Without the tax credits and advance profits, there would never be a wind farm off the Rhode Island coast”

money, i.e., how much Deepwater Wind is prepared to pay the town for landing rights. However, there are many people in this state who don't care for wind turbines. In fact, a former publisher and past president of the Rhode Island Press Association and the New England Press Association recently authored an op-ed published by the *Providence Journal* decrying the impact the offshore wind project will have on residential electric bills, while the wind farm will barely create any new jobs. As Rick Wilson put it, “Without the tax credits and advance profits, there would never be a wind farm off the Rhode Island coast. Economically it doesn't make sense. It is not a job generator and certainly will not save money, but many 'environmentalists' will do anything to get rid of carbon-based electricity generation, including shooting themselves and us taxpayers in the foot. They continue to push wind and solar despite the fact that they are very inefficient for large-scale use.”

Exhibit 10. The Future For Rhode Island?



Source: *Providence Journal*

In every case somewhere between one-third and one-half of the wind turbines were not turning

We recently saw a number of these offshore wind farms in Denmark and Germany. It was interesting seeing them appear as tiny marks on the horizon and then grow in size as we drew nearer. Probably the more interesting issue was that for every wind farm we observed, in every case somewhere between one-third and one-half of the wind turbines were not turning. In a couple of cases there were no wind turbines turning, or turning so slowly it would be impossible to harm any birds flying nearby. As European electricity prices continue to rise, residents are becoming less enamored with wind and solar energy due to their high cost and variability output on the countries' respective power grids.

In Charlestown, where our summer home is located, a battle has been raging for about a year between a wind farm developer and

The battle was resolved when the town council voted to approve an agreement to purchase the property and preserve it as open space

residents over the approval of an application to install two 410-foot tall wind turbines on a 78 acre tract of farm land adjacent a residential development and to Route 1, the main highway that traverses the town. The battle was resolved when the town council voted to approve an agreement to purchase the property and preserve it as open space. Funds were already available for the \$2.1 million purchase from bonds sold earlier under the Open Space Bonding Authority. For a home in Charlestown valued for tax purposes at \$300,000, the annual cost for interest and repayment of the funds used to purchase the property would be \$24.55 a year for the 20 years of the bonds' life. The various alternatives for the developer's property – wind turbines or low-cost housing – would all result in a negative cost to the town above any taxes collected.

Deepwater Wind was the winner of the two offshore wind energy sites with a bid of \$3.8 million

At the end of July, the Department of the Interior's Bureau of Ocean Energy Management (BOEM) held an auction of leases in federal waters roughly 17 miles south of Rhode Island, between Block Island, Rhode Island, and Martha's Vineyard, Massachusetts for the development of wind farms. Deepwater Wind was the winner of the two offshore wind energy sites with a bid of \$3.8 million, which will obligate the firm to pay \$500,000 in annual lease rental payments until the wind farm is built, at which point the lease rental would switch to a royalty on the value of power generated.

Deepwater Wind plans to develop the Deepwater Wind Energy Center, a utility-scale wind farm of up to 200 turbines with a regional transmission system linking Long Island, New York, to southeastern New England on the sites. Deepwater Wind's CEO Jeffrey Gybowski stated, "This is an enormous step forward for the industry. This is the best site for offshore wind in the United States, bar none." He went on to say, "Our Deepwater Wind Energy Center Project will produce clean power and jobs for an entire region. It's very exciting." I'm sure it is because the production credit provides an attractive return on investment for this hedge fund-owned investment vehicle. It may not be such a good deal for the local residents.

Here Comes The UN IPCC Report: Climate Debate Over?

The draft IPCC report also dismisses the recent slowdown in global warming as due to short-term factors

Brace yourself. The first drafts of the United Nation's Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) have been leaked to the media in an attempt to frame the climate change debate that has slipping away in recent months from those scientists, politicians and media who have argued vociferously that the world is careening toward a cataclysmic end if we don't stop burning fossil fuels. *The New York Times*, one of the publications with a leaked draft, called the report's "near certainty" that humans are responsible for the rising temperatures and this warming will lead to sea levels rising by more than three feet by the end of the century a stark warning and a clarion call for action. The draft IPCC report also dismisses the recent slowdown in global warming as due to short-term factors.

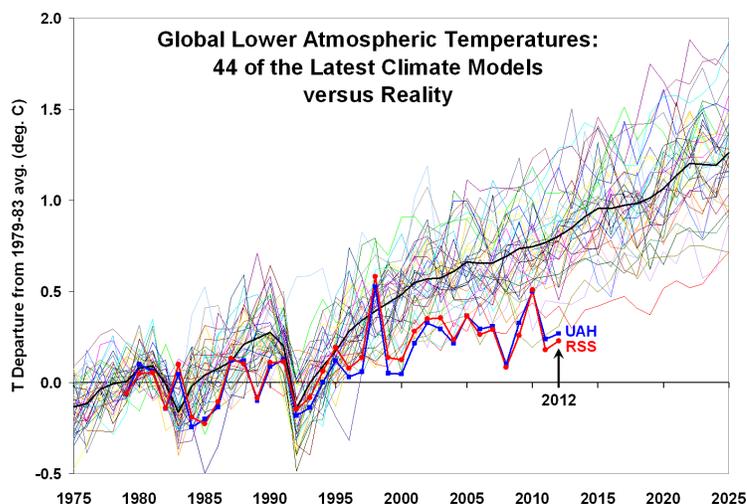
One reason observers don't expect the draft to be modified is because only sympathetic scientists are invited to participate in the meeting

We also find it interesting that The Economist and The New York Times, staunch climate change supporters in earlier years, have changed their position

According to various media articles about the leaked report, it is possible there may be changes made to the final report so UN and IPCC officials are dismissing arguments over the contents of the draft. There are other observers who contend that the drafting process leaves little room for modifications when the several hundred scientists and governmental representatives assemble in Stockholm, Sweden in late September for a four-day meeting to review, possibly modify and approve the AR5 draft. Assessment reports have been issued about every 5-6 years since the IPCC was founded in 1988. One reason observers don't expect the draft to be modified is because only sympathetic scientists are invited to participate in the meeting, so you have what insurance actuaries refer to as self-selection, which often turns into adverse-selection. Only people with one view are judges of the need to revise the draft.

The IPCC does not conduct research, but rather prepares its report by reviewing all the climate research published in the interim since the last report and then updates its findings and recommendations based on the interpretation of that research. Given the errors in AR4, which IPCC officials were forced to acknowledge and some of the recent high quality, peer-reviewed research studies challenging fundamental assumptions of the computer models climate change proponents use to bolster their arguments, we are amused although not surprised about the more adamant position the draft IPCC AR5 report has taken. We also find it interesting that *The Economist* and *The New York Times*, staunch climate change supporters in earlier years, have changed their position, or in the case of the *Times* have abandoned their environmental coverage. Maybe they examined the chart of the temperature forecasts against the actual data of the past 15 years.

Exhibit 11. Actual Temperatures vs. Forecasts



Source: skepticalscience.com

A recent review of climate models finds “that the continued [global] warming stagnation over 15 years, from 1988-2012, is no longer consistent with model projections even at the 2% confidence level”

There are many legitimate reasons for reducing our conventional energy consumption and cleaning up the atmosphere. Much as residents in communities banded together in earlier times to construct water and sewer systems to improve their collective health and lifestyle, we should be banding together to clean up our environment. What we are concerned about are the policy prescriptions dictated by climate change advocates based on computer model projections that have failed to successfully model recent climate conditions. A recent review of climate models by leading German climatologists Dr. Hans von Storch, Dr. Eduardo Zorita and others finds “that the continued [global] warming stagnation over 15 years, from 1988-2012, is no longer consistent with model projections even at the 2% confidence level.” What it means is that there is a greater than 98% probability that climate models are unable to explain the stagnation in warming over the past 15+ years. The climatologists suggest three possible explanations: 1) models underestimate natural climate variability; 2) climate models fail to include important forces such as ocean oscillations and solar amplification; and 3) models assume exaggerated climate sensitivity to man-made CO₂.

Other analyses have reached similar conclusions. One of the more recent was conducted by Robert S. Pindyck, a physicist, engineer and Professor of Economics and Finance at MIT’s Sloan School of Management. The study is to be published in the *Journal of Economic Literature*, and was recently published by the National Bureau of Economic Research. The title of the study asks the question: “Climate Change Policy: What Do the Models Tell Us?” In a blunt two-word answer, Dr. Pindyck answers, “Very little.” He proceeds to analyze the 22 peer-reviewed climate models, referred to as integrated assessment models (IAMs). While most of the models have six constituent parts, the fact is that the modeler has great freedom to select his inputs. Dr. Pindyck concludes that “these models can be used to obtain almost any result one desires.”

Much about how these feedback loops actually work is unknown, making it difficult to create models that can accurately model past climate conditions

When you consider “the guts of the models,” as Dr. Pindyck explains, a pseudo-complexity becomes evident. He goes on to say: “for some of the larger models, the ‘guts’ contain many equations and can seem intimidating. But in fact, there are only two key organs that we need to dissect.” The first of these organs is “climate sensitivity,” or the temperature increase that would come from a doubling of man-made CO₂ levels. The weakness in this organ is that the physical mechanisms of the climate that determine its sensitivity involve feedback loops. Much about how these feedback loops actually work is unknown, making it difficult to create models that can accurately model past climate conditions, and thus calls into question any projections from the models.

Dr. Pindyck questions the second key organ in the models, the “damage function” which describes how much damage higher temperatures might do. Because there are no clear relationships, the

These studies have concluded that the climate models utilized by the IPCC have their feedback relationships backwards, i.e., magnifying the impact of CO2 in the atmosphere on global warming

There are many moral reasons to be concerned about the level and growth of emissions in our atmosphere and we should be working to reduce them

modelers do little more than make up functional forms and corresponding parameter values. As a result, Dr. Pindyck concludes that “the damage functions used in most IAMs are completely made up, with no theoretical or empirical foundation.” The IPCC produces a graph of the climate sensitivities of the peer-reviewed models showing how they all pretty much reach the same conclusion, but since all the data is taken from the same made-up relationships input into the models, their output is based on circular analysis and of little value.

We have covered some of the more recent studies dealing with attempts to understand the role of clouds and pollution in the atmosphere and how they impact the role of the sun on our climate. These studies have concluded that the climate models utilized by the IPCC have their feedback relationships backwards, i.e., magnifying the impact of CO2 in the atmosphere on global warming. Based on our education in econometrics and career in model building and forecasting, we are not overwhelmed with results merely because they come from a computer model. We were trained to be careful of “garbage in, garbage out.”

While not denying the history of temperature rises and increased CO2 emissions over the past 50 years, we also believe there is so much unknown about the workings of our climate that we cannot blindly accept the climate change advocates’ mantra that “The debate is over.” There are many moral reasons to be concerned about the level and growth of emissions in our atmosphere and we should be working to reduce them, but we remain unconvinced that the draconian measures being planned and/or mandated for our economy based on projections from computer climate models may not actually create worse social and economic problems. But then again, we don’t depend on government and academic stipends for our livelihood. Just get ready for the upcoming onslaught of media stories about the IPCC AR5 report and the need for the public to acquiesce to its conclusions and recommended actions.

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