
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

Shale Alters Energy Market, Business Strategy and Investing

What these investment changes signal is the impact America's Shale Revolution is having on the overall energy market

Recently, the *Houston Chronicle* profiled the current investment strategies of four leading investors who have been active in the energy sector based on examining their recent buys and sells. What these investment changes signal is the impact America's Shale Revolution is having on the overall energy market and how it is forcing companies in all energy subsectors to reassess their corporate strategies, and in some cases, radically alter them, and change capital flows into (and out of) the sectors. We believe examining some of these new industry trends and investment themes along with how management teams are responding offers a perspective on the possible long-term future for the domestic energy industry.

The four investors included: Carl Icahn, T. Boone Pickens, George Soros, and Warren Buffett

The newspaper article discussed the recent moves of the four investors following an examination by a reporter of their regulatory filings showing changes in their investment holdings for the third quarter ending September 30th. The four investors included: Carl Icahn, T. Boone Pickens, George Soros, and Warren Buffett. Each manager is known for different characteristics and each of them is approaching energy investments differently. Carl Icahn, known for his activist approach to investing, has successfully forced energy companies such as Chesapeake Energy (CHK-NYSE) and Transocean (RIG-NYSE), along with others, to make substantive shifts in their corporate strategies and, in the case of Chesapeake, management changes in order to unlock value for the shareholders. T. Boone Pickens, the highly successful oil and gas entrepreneur and noted corporate raider in the 1980s, has experienced a rough patch that caused him to dump nearly half of his holdings of oil and gas companies and witnessed his fund shrink by 41% in the quarter to \$60.1 million. On the other hand, George Soros, one of the founders of a highly successful commodity and macro trend

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But the big winner has been the activist investor because he has been able to change corporate cultures in order to unlock trapped value in his investments for the benefit of all shareholders through higher share prices

hedge fund, boosted his oilfield service company holdings by nearly \$275 million while at the same time cutting his E&P and power company investments. Warren Buffett, the Oracle of Omaha, the world's most prominent value investor and CEO of Berkshire Hathaway (BRK.A-NYSE), bought a position in Exxon Mobil Corp. (XOM-NYSE) worth \$3.8 billion as of mid-November while cutting his holding in ConocoPhillips (COP-NYSE) by 44% to just under \$1 billion.

Interestingly, a column in *Barron's*, a leading investment newspaper, in mid-October recommended ExxonMobil for value investors. The columnist's conclusion about the stock was “Exxon Mobil is a solid, well-run company trading at a discount to historical valuations. It also has the highest return on invested capital among peers, at 17% and a dividend yield of nearly 3%. With just a little bit of good news (higher natural gas prices that help make its 2010 \$41 billion purchase of XTO Energy better), investors could see 8% to 10% total returns and low volatility in the next year.” Wow! An 8% to 10% total return in 2014! One has to think Mr. Buffett isn't overly optimistic about the stock market in 2014 if he finds Exxon Mobil an attractive investment, given that the S&P 500 index has risen 22% this year through mid-November, and over the past three-year period, it is up by 49%, before accounting for any dividend income, and Wall Street pundits continue to suggest that the past will be prologue for the market.

So what can we take away from the article? The single energy pro investor has struggled to make his fund a success, especially after losing significant amounts of money from a failed West Texas wind farm venture. He has also been unsuccessful promoting demand for natural gas powered vehicles, which would boost the business for his clean energy company. The top value investor found a great value with reasonable upside in 2014 if one believes the stock market might struggle or suffer a correction. The famous macro and commodity trend investor finds the oilfield service sector providing value and growth potential. But the big winner has been the activist investor because he has been able to change corporate cultures in order to unlock trapped value in his investments for the benefit of all shareholders through higher share prices. While these four high profile investors generate curiosity about their actions, the real issue is how the American shale revolution is changing energy markets, the business strategies of energy and energy service companies and where investors may find profitable investment opportunities.

Since the shale revolution emerged in the mid-2000s, the crude oil and natural gas produced from shale formations across the nation has dramatically reshaped the domestic energy business. After decades of stable and then declining oil and gas production, America's energy industry is now enjoying rising output. In fact, this rising production has turned every aspect of the U.S. energy business upside down and the impact is spilling over into global oil

As often experienced during disruptive periods, there are a handful of nimble participants who become early adopters of the disruptive technology and thus major beneficiaries of its impact

and gas markets. As hydrocarbon markets are disrupted by the surge in U.S. output, E&P and oilfield service companies have been forced to rethink their business strategies. Moreover, the need to rethink corporate strategies has extended to coal companies, electric utilities, alternative energy companies, and global manufacturing and petrochemical companies who rely on oil and/or gas for raw materials and/or feedstocks. As often experienced during disruptive periods, there are a handful of nimble participants who become early adopters of the disruptive technology and thus major beneficiaries of its impact. Their success draws many imitators. Most of the imitators tend to be larger companies wed to their legacy strategies and adjust at a pace much like the proverbial "battleships" that require a long time to turn around in order to head in a different direction. As the battleship imitators turn, a mad rush usually ensues that drives industry trends at an accelerating rate, for example, the cost to lease shale acreage during the era of the "Great Land Grab."

The primary economic benefit from higher domestic oil production has been a 21% reduction in oil imports that has also been helped by lower consumption partially due to the 2009 recession and the subsequent slow recovery

The shale revolution's impact has resulted in significant growth in crude oil and natural gas production from shale formations. Between January 2008, when the industry shift to oil and liquids-rich gas plays became pronounced, and August 2013, the latest data available from the Energy Information Administration (EIA), monthly oil production has grown by 46.8% from 5.1 million barrels a day (b/d) to 7.5 million b/d. Likewise, natural gas production from the Lower 48 states has increased by 36.9% from January 2005, the demonstrative beginning of the shale revolution, to August 2013. Natural gas output has climbed from 54.68 billion cubic feet a day (Bcf/d) to 74.84 Bcf/d. Since crude oil pricing is primarily established by global oil pricing trends, there has been little impact on domestic oil prices. However, the primary economic benefit from higher domestic oil production has been a 21% reduction in oil imports that has also been helped by lower consumption partially due to the 2009 recession and the subsequent slow recovery. The surge in natural gas production, on the other hand, has hammered gas prices as they have declined during the January 2005 to August 2013 period from \$5.53 per thousand cubic feet (Mcf) to \$3.57 Mcf, a 35.4% drop.

These optimistic forecasts are contributing to the belief that the United States can actually become energy independent

The dramatic oil and gas production growth has led many energy forecasters to predict a continuation of this growth for many years into the future. Expectations are that the growth will last for at least 10 years and possibly as long as 20-30 years. These optimistic forecasts are contributing to the belief that the United States can actually become energy independent, but that seems unrealistic given that domestic oil production accounts for barely over 50% of refinery gross inputs, meaning that for parity between supply and demand to be achieved, domestic oil output would have to double from its nearly 8 million b/d rate of early November. If shale oil output continues to grow and the amount of conventional oil from Gulf of Mexico fields increases meaningfully, how close the nation

All three of these trends are moving in the right direction for less oil consumption in the future

could come to true energy independence would depend on American's oil consumption appetite. Since oil is primarily a transportation fuel, we are discussing issues such as the number of vehicles in the country, how fuel-efficient they become and how many miles citizens drive each year. All three of these trends are moving in the right direction for less oil consumption in the future. Whether the trends hold and whether they prove significant enough to cut oil consumption by 20% to 30%, an estimate of the magnitude of efficiency gains that coupled with continued oil production growth would put the U.S. in reach of supply/demand equilibrium, is a huge question mark.

"Fields have become sweet spots," says consulting geologist Art Berman

The nature of shale formations and their production characteristics have presented business-altering challenges for the energy industry. As Scott Tinker of The University of Texas at Austin put it, "we know where the shales are; they are easy to find." The problem is that shales are not easy to flow. On the other hand, according to Dr. Tinker, "we just don't know much about the shales; we are just starting out." What we do know, however, is that contrary to initial beliefs, all shales are not alike. Rather than uniform blanket formations underlying hydrocarbon producing basins, shales have pockets of better-producing areas much like conventional oil and gas fields. In fact, "fields have become sweet spots," says consulting geologist Art Berman. These sweet spots tend to produce better, and following stimulation, they often produce at prodigious rates, but suffer very steep decline rates in their early years of producing. After several years of sharply falling production, the shale wells settle out and produce at a stable rate for years.

In order to grow production, drilling of new wells needs to continue at a healthy pace, and possibly at an accelerating rate

The dilemma for the energy business is that in order to grow production, drilling of new wells needs to continue at a healthy pace, and possibly at an accelerating pace, in order for the higher flowing new wells to offset the lost production from the rapidly declining output from existing wells. This approach is what is making shale well sites seem like manufacturing operations – drilling a number of similar wells as efficiently as possible. To minimize the damage to surface locations, operators are employing pads in which multiple wells are drilled from the same surface location in order to cover the entire formation and tap the maximum potential producing area.

Over the years, producers have experimented with the length of the lateral portion of wells drilled as well as the number of fracture stages employed in the completion. Establishing the range of drilling and completion needs for shale wells is (and will continue) impacting the types of drilling rigs needed and the amount of fracture-horsepower required, and the blend of chemicals, sand and fluid that optimally should be injected into the formation to maximize output. The massive horsepower and fluid volumes used create logistical hurdles with economic and social fallout among the neighboring citizens. The use of pads for conducting operations is one way to minimize these logistical needs and their disruptive impact on the

Producers are pushing down rig day rates and pricing for fracturing services, squeezing service company profitability and transferring those profits back to themselves

environment and population. But the greatest challenge for producers is the cost of all the equipment and workers required, which hurts well profitability. As a result, producers are pushing down rig day rates and pricing for fracturing services, squeezing service company profitability and transferring those profits back to themselves. The huge capital requirements for developing shale plays and the need to boost returns on investment mean producers must claw back the profitability they initially transferred to service contractors when the shale revolution started. As producers claw back the previously transferred economics, service companies must adjust their business strategies in order to maximize their profits and returns.

How has and will the focus on unconventional resources impact oil and gas companies?

1. Producers were swept up in the early days of the shale revolution into a land rush as the strategy was to stake out the largest acreage positions as possible.
2. The land grab resulted in high lease pricing terms (bonuses, per acre rentals, and drilling commitments) that drove an explosion in drilling and completion activity.
3. High Initial Production (IP) rates of shale wells swamped the natural gas market, driving down the forward price significantly, and hurt producer profitability and returns on investment.
4. Low natural gas prices negatively impacted producer cash flows and increased the need to seek alternative capital funding sources. The producers turned to their commercial banks, Wall Street by selling new shares, industry joint ventures, sales of assets, mergers, and private equity capital infusions.
5. Some producers were able to shift their drilling focus from dry natural gas plays to crude oil and liquids-rich gas plays. The producers without that option began aggressively seeking new liquid opportunities thus creating the next land grab wave at inflated prices.

6. The collapse in natural gas prices pressured producers to seek ways to improve their cost structure. Since acreage investments were considered sunk costs, producers' efforts focused on how to reduce the drilling time for wells and to boost the IP of wells through altered/improved well completions. This strategy pressured service company profitability at a time when they were investing heavily to add capacity in order to drill and complete the growing volume of wells producers planned to drill.

The IOCs saw the shale revolution as an opportunity that played to their strategic strengths – low cost of capital, large research and development efforts, and an integrated business model

This profitability challenge is the greatest issue for the shale industry today. While small producers pioneered the shale revolution, the attractiveness of shale for major integrated oil companies (IOCs) grew. Most of the IOCs had abandoned the United States in the 1990s, especially the onshore portion, in favor of international land and offshore markets. The IOCs saw the shale revolution as an opportunity that played to their strategic strengths – low cost of capital, large research and development efforts, and an integrated business model. The shale plays were also attractive to national oil companies (NOCs) who saw both the opportunity to secure attractive new oil and gas resources that were perceived as being quite profitable and to learn about the technologies required to undertake shale development that was likely to occur in their homelands. The validity of the major oil interest in the shale revolution was confirmed with the agreement by Exxon Mobil Corp. (XOM-NYSE) to purchase XTO Energy in 2010 for \$38 billion, which increased to \$41 billion in value by the time of the transaction's closing.

Two and a half years following the XTO deal, ExxonMobil Chairman and CEO Rex Tillerson was quoted telling investors we are “losing our shirts” on natural gas prices

As we learned from our sources and an article in *Market Watch*, ExxonMobil had missed the development of the shale business. Given that the company's long-term (40 years) outlook called for natural gas to play a greater role in both North American and global energy markets, securing a prominent place in the industry trend that promised huge, profitable gas supplies for decades into the future was highly attractive. Two and a half years following the XTO deal, ExxonMobil Chairman and CEO Rex Tillerson was quoted telling investors we are “losing our shirts” on natural gas prices. While the XTO buy may have marked the start of a new phase for the shale revolution, Mr. Tillerson's comments may have marked a shift into the next phase.

The XTO purchase came at a time when IOCs and NOCs were aggressively seeking shale opportunities by buying companies already active in the shale plays, forming joint ventures with capital-constrained companies, buying acreage outright although that option was limited, and searching for the next shale play where they could stake out an early acreage position. Just as we have seen buyer's remorse from Mr. Tillerson, Royal Dutch Shell's (RDS.A-NYSE)

Shell CEO Peter Voser acknowledged that “unconventionals did not exactly play out as planned”

CEO Peter Voser acknowledged that “unconventionals did not exactly play out as planned,” in an interview with the *Financial Times*. This followed Shell’s \$2.1 billion charge for impairment of the value of its U.S. tight oil assets and the company’s listing of its Eagle Ford acreage in South Texas for sale following a strategic review of its U.S. shale portfolio. Mr. Voser further commented that Shell’s U.S. unconventional oil and gas operation was an “emerging strategic business which needs attention, needs fixing over the next two, three, four years.” That will fall to the next CEO as Mr. Voser is taking early retirement from Shell.

Another high profile shale player was BHP Petroleum, the oil and gas subsidiary of the Australian miner BHP Billiton Ltd. (BHP-NYSE), which acquired acreage in the Fayetteville Shale in April 2011 for \$4.75 billion and later that year purchased Petrohawk Energy Corp. for \$15 billion. Last year BHP wrote down the value of its Fayetteville Shale holdings by \$2.84 billion, or nearly 60% of the purchase price. Smaller companies also have had to address the value of their dry natural gas assets due to the collapse in gas prices and prospects, based on the forward price curve for natural gas futures, that there will be little improvement in prices in the foreseeable future.

From an environment where Wall Street rewarded producers for accumulating assets regardless of negative cash flows and huge debt burdens, investors are now demanding producers boost their revenues to cover their drilling and completion costs

The asset write-downs are only one manifestation of the financial struggles the industry is confronting. In order to offset balance sheets that have ballooned with debt to support development activity, companies are selling assets – engaging in portfolio rationalization. For example, Pioneer Natural Resources (PXD-NYSE), with extremely attractive positions in the Permian Basin and the Eagle Ford and Edwards Reef plays in South Texas has recently sold its Alaska holdings to help fund its development expenditures. Other companies forced to adjust their acreage portfolios and restructure their operations to better balance cash costs against development expenses include Chesapeake Energy (CHK-NYSE) and EnCana (ECA-NYSE). Both companies have new CEO’s due to problems in managing previous growth and their balance sheets during the early phase of weak natural gas prices. From an environment where Wall Street rewarded producers for accumulating assets regardless of negative cash flows and huge debt burdens, investors are now demanding producers boost their revenues to cover their drilling and completion costs. While oil and NGL prices have held up reasonably well, the continued weakness in natural gas prices makes meeting Wall Street’s expectations a challenge without streamlining the companies to cut drilling obligations. Art Berman estimates that the industry faces a \$50 billion capital deficit, which would be exacerbated should crude oil prices fall.

Archie Dunham, the current non-executive chairman of Chesapeake and former CEO of ConocoPhillips (COP-NYSE), commented in passing that the biggest challenge in selecting a new CEO for

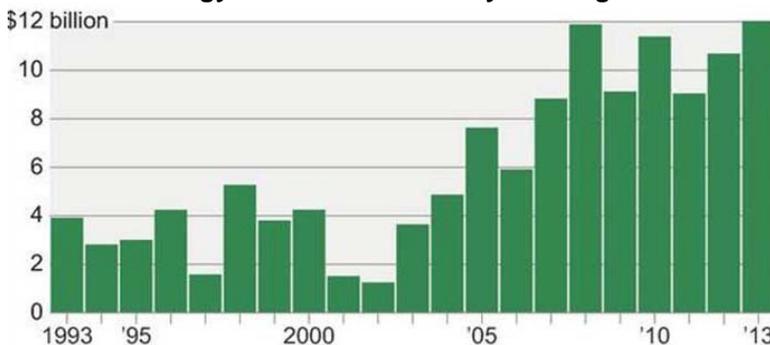
Mr. Dunham pointed out that upstream operations constantly need cash flow and downstream businesses are good at generating that cash

Of these funds, 106 have raised funds with exposure to energy totaling \$160 billion over the past decade

Chesapeake was finding an executive who could rebalance development costs with limited cash flows due to low natural gas prices and the possible erosion in crude oil and liquids prices. In what would have to be taken as a backhanded swipe at the strategy of the former chairman and CEO of ConocoPhillips, Jim Mulva, Mr. Dunham pointed out that upstream operations constantly need cash flow and downstream businesses are good at generating that cash. Implicit in his comments was that he thought the split up of ConocoPhillips into separate upstream and downstream businesses was not a wise move.

Another lifeline for the producers has been the tsunami of capital flowing to the industry from private equity funds. A recent *Oil and Gas Investor* magazine report pointed out that there are 379 private equity firms that will consider investing in oil and gas. Of these funds, 106 have raised funds with exposure to energy totaling \$160 billion over the past decade. More pointedly, 90 of the 379 funds target oil and gas exclusively or list it as a core investment focus. Of those 90 funds, 52 have raised \$68.7 billion since 2003. Recently, Carlyle Group LP, (CG-NMS) the world's second largest manager of alternative investment funds, announced it was planning to raise new funds targeting oil and gas and energy - \$4 billion for North America energy and \$1.5 billion each for an international energy fund and a North American power fund. It is estimated that at any point in time, there is \$60 billion of private equity capital on the sidelines targeting energy investments.

Exhibit 1. Energy IPOs And Secondary Offerings



Source: Dealogic, *The Wall Street Journal*

The success of private equity in energy is shown by the surge in initial public offerings (IPOs) of private companies

Not all of the private equity funds are targeting oil and gas assets. There is a substantial amount of capital seeking oilfield service, midstream and downstream investment opportunities along with utility and power opportunities. The success of private equity in energy is shown by the surge in initial public offerings (IPOs) of private companies. By mid-October according to *Dealogic*, exploration and production companies had raised \$12 billion in IPOs and secondary offerings, putting the industry on track for 2013 to be the biggest year in new equity-raises since 1993. Much of the activity in IPOs has been driven by private equity companies

The most successful and largest shale formations are being developed in geographic locations where there is a lack of infrastructure, such as gathering systems and long-distance pipelines along with gas processing plants and storage facilities

The approval of four liquefied natural gas (LNG) export terminals, which should be ready to begin shipping gas in 2015, offers hope that a new outlet for surplus gas volumes may be near and domestic gas prices may begin to rise in anticipation of reduced surplus gas

capitalizing on the success of prior shale-focused investments. Private equity funds are also sellers of shale investments as demonstrated by Devon Energy (DVN-NYSE) agreeing to pay \$6 billion for the South Texas assets of private-equity-backed E&P company GeoSouthern. We suspect this will not be the last sale or cash-out by private equity in the immediate future.

The nature of the shale revolution has altered many of the traditional theories about how oil and gas resources are developed and how they make it to market. The most successful and largest shale formations are being developed in geographic locations where there is a lack of infrastructure, such as gathering systems and long-distance pipelines along with gas processing plants and storage facilities. The absence of pipelines has created a market for railroads to build a network of tanker cars and unit trains to ship crude oil and gas liquids output to refineries and storage terminals. Unit trains also necessitate the construction of loading and unloading terminals and tank storage facilities. At the same time, the glut of Canadian heavy oil coming into the mid-Continent region of the U.S. has created a wide discount between prices for oil there and prices earned if the oil can make it to any of the nation's three coasts. Railroads are providing the flexibility to ship oil to the most profitable location even though rail tends to be slightly more expensive than pipelines. All of these infrastructure investments will require substantial capital, some of which can be obtained through the participation of master limited partnerships (MLPs) with tax-favored cost of capital.

At the end of the day, the critical issue for the shale revolution and its participants is the lack of meaningful profitability in the business. Crude oil and gas liquids prices are largely tied to the global price of oil in which the U.S. has little input. Although producers are making healthy profits, future profitability is tied to the course of world oil prices. Natural gas remains a local market, although the locality has expanded as increasing volumes of gas are being exported to Eastern Canada and Mexico. The approval of four liquefied natural gas (LNG) export terminals, which should be ready to begin shipping gas in 2015, offers hope that a new outlet for surplus gas volumes may be near and domestic gas prices may begin to rise in anticipation of reduced surplus gas. At issue now is whether, and how many, additional LNG export terminals may be approved by the government. This question is at the center of a battle between two powerful vested interests. Gas producers see increased LNG exports as a ticket to higher gas prices and improved profitability. On the other side of the issue are the petrochemical and manufacturing companies that see low gas prices as their ticket to a global competitive cost advantage that is rejuvenating the industrial sector and adding jobs in the U.S. Higher natural gas prices would hurt the anticipated manufacturing resurrection.

Service companies are struggling to ascertain the level of activity for the industry over the next few years and the types of equipment and services that will be in demand

Wall Street is changing what it wants from producers active in the shale revolution. Until commodity prices, especially natural gas, move higher, the profitability of developing shale resources will be challenged. For some producers, depending upon the quality of their shale assets and the cost of their operations, there is still likely financial pain ahead. Service companies are struggling to ascertain the level of activity for the industry over the next few years and the types of equipment and services that will be in demand. This will help them decide where to invest. Service companies are also considering where to place their capital bets – North American shale plays, offshore or select international land and shale plays. Additionally, the service companies need to better understand which of their product and service business lines will be of long-term value and which ones they should dispose of. These considerations suggest the service industry is on the cusp of a restructuring. The recent announcement by Weatherford International (WFT-NYSE) that it plans to shed four business lines is a manifestation of that trend. We have also had National Oilwell Varco (NOV-NYSE) decide to split off its oilfield distribution business into a new company. Other corporate moves have involved offshore drilling companies announcing plans to establish MLPs and/or separate companies to hold segments of their current rig fleets. Some of these restructuring moves are designed to help boost capital returns to investors, especially those seeking yield. On the other hand, restructuring of the industry may be due to too many companies chasing the same business and the fact that many of these companies are owned by private equity firms needing to cash in on their investments.

The IOCs and NOCs continue to wrestle with whether their overhead costs, from being large and multinational, will overwhelm their strategic advantages from lower costs of capital and greater R&D capabilities

The sustainability and longevity of the shale plays will be important for midstream companies seeking to invest in infrastructure to handle more production and the movement of these new volumes to profitable markets. The IOCs and NOCs continue to wrestle with whether their overhead costs, from being large and multinational, will overwhelm their strategic advantages from lower costs of capital and greater R&D capabilities. Many of the IOCs and NOCs are going through senior management changes that often signal strategic business reviews and strategic course corrections. The Shell strategy review that led to its shale investment write-down and shale acreage sale has coincided with its CEO's decision to retire, which is an example of how business strategies can be altered by new leadership assuming the helm. Other examples one can point to include the strategic actions of the new CEOs at Chesapeake, ConocoPhillips and EnCana, to name just a few.

On a global basis, Russia, Australia, Canada and OPEC nations are anxiously watching the American shale revolution because its development will impact market opportunities for these players' hydrocarbon resources. Europe and Japan are watching with the hope that they may gain an economic boost from reduced fuel bills from cheaper U.S. shale gas. We were intrigued to hear that people

Being rigid in one's strategy could be a mistake

have traced some of the anti-fracking attacks back to Russian-backed entities. Clearly, Russia feels threatened by the possibility of U.S. LNG undercutting its gas sales into Europe – so threatened it is willing to try to reshape U.S. energy policy.

In running through all the changes underway in businesses and companies involved in the American shale revolution, it becomes clear how disruptive it has been to conventional energy thinking during the past 12-36 months. As we are still in the early stages of understanding the potential of shale, not only must everyone re-examine the assumptions underlying their corporate strategies, they must be prepared to make mid-course corrections if development dictate a change to those assumptions. Being rigid in one's strategy could be a mistake. Not everyone will win. Not everyone will lose. There will be winners, but just who they are is not clear, yet. As one observer put it, "This is just the oil business being the oil business." That means be prepared.

Chad Faces The Downside Of China's Global Energy Policy

The country currently earns about \$1.2 billion from its royalties from its oil production and the operation of the pipeline, and these funds supply about 80% of the country's tax revenues

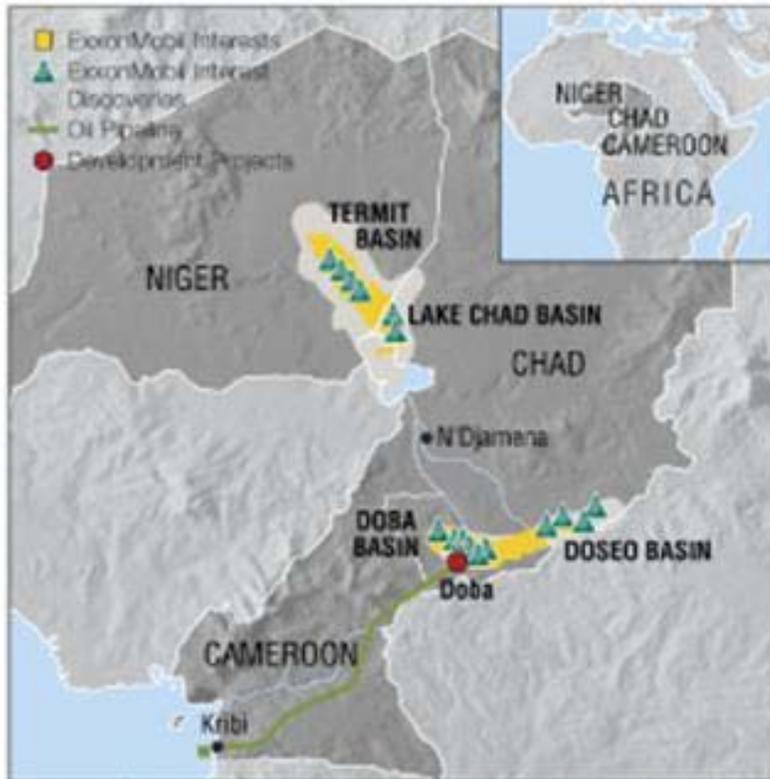
A recent article in *Global Finance* discussed the African nation of Chad, the continent's fifth largest country, and how it is looking forward to tripling its oil output by 2015. The article attracted our attention and as a result, sent us down memory lane to revisit details about the evolution of oil development in Chad and how it marked a major turning point for an old-line pipeline construction company. The article cited recent comments by Chad's Finance Minister Atteib Doutoum that the country's oil production would grow to 200,000 barrels a day (b/d) in 2014 and further increase to 300,000 b/d by 2015. This would be up from the 97,000 b/d Chad is currently producing. The country currently earns about \$1.2 billion from its royalties from its oil production and the operation of the pipeline, and these funds supply about 80% of the country's tax revenues.

The opening of Chad for oil development was a major global event since the project required an agreement between the ruler of the country, who had seized power via a military coup in the 1990s, his government and the World Bank

Oil production in Chad is a relatively young industry. The land-locked African country only began producing its estimated two billion barrels of reserves following the opening of the country to foreign investors in 2000. Initial oil output commenced in 2003, although exploration for oil in the country had begun in the 1970s, which led to a successful drilling effort in the southern region of the country undertaken by Esso, a subsidiary of ExxonMobil (XOM-NYSE) and its consortium, and the oil started flowing the same year through a 650-mile-long pipeline from southern Chad through the Atlantic coast nation of Cameroon to an export terminal. The opening of Chad for oil development was a major global event since the project required an agreement between the ruler of the country, who had seized power via a military coup in the 1990s, his government and the World Bank. Through the World Bank and the International Monetary Fund, financing was arranged to construct the oil export line, which was built and operated by a consortium headed by

ExxonMobil that includes Chevron (CVX-NYSE) and Malaysia’s national oil company, Petronas, and ships the consortium’s oil output. The pipeline cost an estimated \$3.5 billion to build and the World Bank provided Chad with a loan for \$365 million. The loan contained various stipulations including that 80% of the royalties earned from the petroleum business be set aside to assist the citizens of Chad with improved health and educational services.

Exhibit 2. ExxonMobil Oil Production

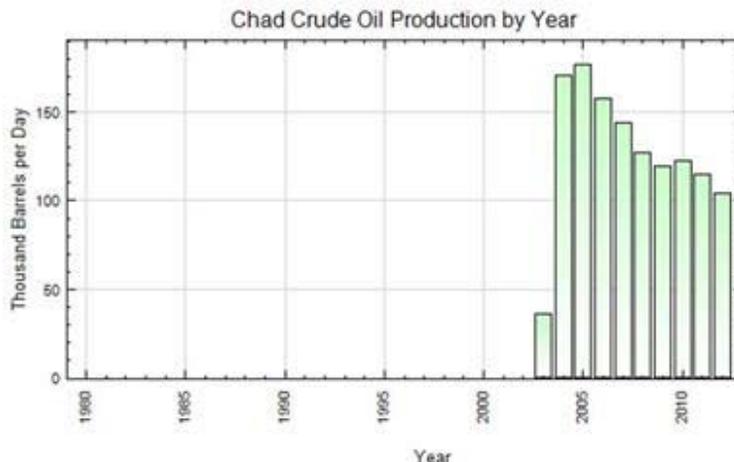


Source: *African Oil*

It ranked 165th out of 176 countries worldwide rated by Transparency International in 2012 for corruption

Chad was, and still remains, one of the most corrupt countries in the world. It was ranked 165th out of 176 countries worldwide by Transparency International in 2012 for corruption. As a result of its reputation, securing the financing for the pipeline depended on ExxonMobil and its consortium members’ involvement and their commitment to high ethical standards regarding the oil moved through the pipeline along with the government’s promises to the World Bank to develop social improvement programs for its people, among the poorest in Africa. By 2005, oil production in Chad had reached 225,000 b/d before starting a steady decline. The decline was hastened by a change in the relationship between the government of Chad and the World Bank.

Exhibit 3. Chad's Oil Production Due To Rise



Source: *Independent Business*

The relationship between the two countries has changed due to the discovery of environmental damage done by Chinese oilfield service companies

The prospect of a dramatic change in Chad's oil output is due to the efforts of the Chinese oil industry, executing its government's strategy to secure energy resources and other raw materials to feed its economy. In recent months, however, the relationship between the two countries has changed due to the discovery of environmental damage done by Chinese oilfield service companies. The history of the oil business in Chad during the past 15 years has been marked by corruption, herculean social improvement and construction challenges, and environmental damage.

Exhibit 4. Land-locked Chad



Source: *Wikipedia*

The pipeline from Chad to the African coast to export the oil output was planned by the ExxonMobil consortium along with the governments of Chad and Cameroon, and was financed by a consortium of western banks along with the World Bank. Given the mission of the World Bank to promote socially responsible economic development and the history of the corruption and poverty in Chad, the agency attached specific conditions for the granting of the loan

Each time the construction moved into a new local tribe's area, Willbros would terminate its existing local labor and hire new local labor from the tribe and train the workers to drive vehicles and perform other construction-related functions

The ultimate result was that the senior management of Willbros was replaced with new leadership, which resulted in the company embarking in a new strategic direction

In late 2005, President Idriss Deby of Chad tried to rewrite the World Bank agreement to allow the government to use its oil revenues as it deemed necessary

and commercial loan guarantees. There were also issues related to the environment and the indigenous population that needed to be considered in the pipeline's construction.

The contract to build the pipeline was won by Willbros Companies (WG-NYSE) a century-old international pipeline construction company, recognized for its successful work in inhospitable geographic regions of the world. To meet the conditions as part of the construction of the pipeline, Willbros, working with the ExxonMobil consortium, made protecting the environment and improving the health and educational standards of the indigenous communities through which the pipeline passed a high priority. Since much of this area was made up of tribal communities, each time the construction moved into a new local tribe's area, Willbros would terminate its existing local labor and hire new local labor from the tribe and train the workers to drive vehicles and perform other construction-related functions. As we were recently reminded on our trip down memory lane, some 31,000 workers were hired and trained to build this 650-mile long pipeline.

For Willbros, the completion of this pipeline project coincided with the discovery of massive corruption and fraud in the company's international operations. The fraud never involved the Chad project. The former president of Willbros International, James Tillery, had conspired with consultants and other employees to make payments to government officials for help in securing pipeline construction contracts in Nigeria and Ecuador. Some of the money was siphoned off by Mr. Tillery. The commercial fraud and bribery led to charges of Foreign Corrupt Practice Act violations, books and records violations, and tax fraud violations against Willbros. The ultimate result was that the senior management of Willbros was replaced with new leadership, which resulted in the company embarking in a new strategic direction that has transformed this century-old firm from an internationally-focused firm to a North American-focused construction service company. The interesting twist is that Mr. Tillery, who was believed to have disappeared in Africa, has not been apprehended after a decade of searching for him.

In late 2005, President Idriss Deby of Chad tried to rewrite the World Bank agreement to allow the government to use its oil revenues as it deemed necessary. His move followed the rise of rebel groups in Sudan along the eastern border of Chad. It was assumed the policy change was designed to allow the government to divert money for defense of the country. As a result of this move, the World Bank suspended some \$124 million in loans to Chad. By April 2006, with global oil prices having fallen to \$75 a barrel, Chad threatened to turn off its production taps in an attempt to pressure the World Bank to relent on its loan release. The threat led the World Bank to renegotiate its loan terms, and after Chad repaid \$65.7 million in outstanding loans, terminated the loan.

CNPC's subsidiary, Greatwall Drilling Company, had been putting oil into uncovered pits and failing to clean up spillages

The lack of World Bank involvement meant that Chad was free to invite any country in to exploit its oil reserves. China National Petroleum Company entered and began a drilling effort undertaken by Greatwall Drilling Company. As a result of successful drilling, CNPC has turned around Chad's oil production. While this is positive news for Chad, the government subsequently discovered evidence that Greatwall Drilling had engaged in questionable drilling practices that have contributed to significant environmental issues. According to evidence gathered by oil minister Djérassem Le Bémadjiel, CNPC's subsidiary, Greatwall Drilling Company, had been putting oil into uncovered pits and failing to clean up spillages. The government moved immediately to suspend drilling by CNPC but that raises the question of whether the Chinese will be punished in any other manner while the country benefits from the increased oil production and the continued operation of a small refinery built by China in the country shortly after it entered in 2008.

This situation points up the potential downside of inviting Chinese companies in to exploit a country's natural resources

The discovery of the oil spill also raises issues for ExxonMobil who operates the pipeline since the consortium that owns the pipeline adheres to very high environmental and ethical standards regarding the oil it ships. This environmental damage is not the first time Chinese oil companies and their oilfield service companies have created problems in Africa. Chad, one of the world's most corrupt countries, who struggled to attract help from highly ethical oil companies and financial supporters and then returned to its old habits, is now embroiled with a global powerhouse determined to secure natural resources around the world to feed its enormous economic machine. China appears willing to violate basic environmental standards in furtherance of its objectives. This situation illustrates the potential downside of inviting Chinese companies in to exploit a country's natural resources. In this case, maybe the leadership of Chad got what it deserved.

Gasoline Prices And New Car Sales – A Real Relationship?

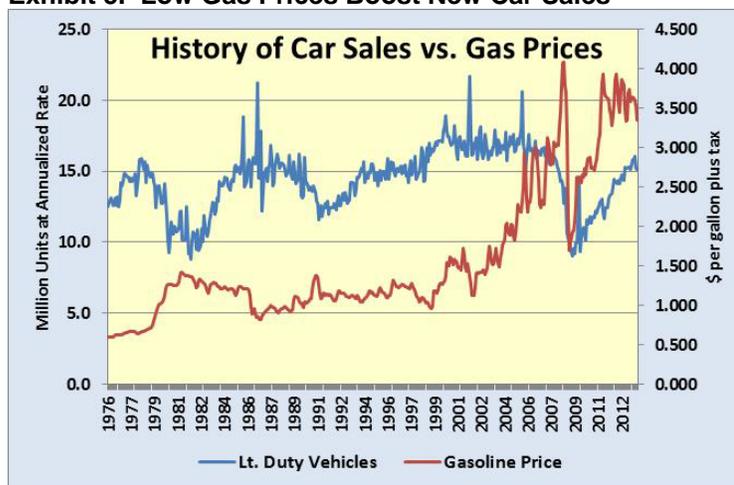
Monthly gasoline prices averaged \$3.42 per gallon in October for all blends, down from \$3.60 a gallon in September and the lowest monthly gas price since January's \$3.39 a gallon

When the October monthly figures for new car sales were announced at the start of November, there was a chart accompanying one news story suggesting that low gasoline pump prices were a driver for the healthy sales volume increase. October new-car sales in the U.S. rose 10.6%, to 1.2 million cars and trucks. That put the seasonally adjusted annualized sales rate at 15.23 million units, down slightly from the 15.28 million annualized sales rate of September and marked the second consecutive monthly decline. Monthly gasoline prices averaged \$3.42 per gallon in October for all blends, down from \$3.60 a gallon in September and the lowest monthly gas price since January's \$3.39 a gallon. Did the low gasoline price, coupled with extensive media coverage of speculation of sustained low gasoline prices, drive auto sales? We decided to take a look.

Whenever gasoline prices increased due to supply dislocations or crude oil price hikes, new-car sales suffered

We examined the long-term pattern of new-car sales and gasoline pump prices. (Exhibit 5.) It is evident when looking at the chart that periods of low and stable gasoline prices coincide with healthy and rising new-car sales. Whenever gasoline prices increased due to supply dislocations or crude oil price hikes, new-car sales suffered. In most cases those two events have been tied together by economic recessions that have sapped consumer incomes via job losses and undermined consumer confidence. Surprisingly, during the run up to \$4+ per gallon prices in 2008, new-car sales remained healthy, although the pace of annualized monthly sales demonstrated a long-term downward trend. When gasoline prices spiked above the \$4 a gallon threshold, new-car sales collapsed, but this fall was also associated with the 2008 financial crisis.

Exhibit 5. Low Gas Prices Boost New Car Sales

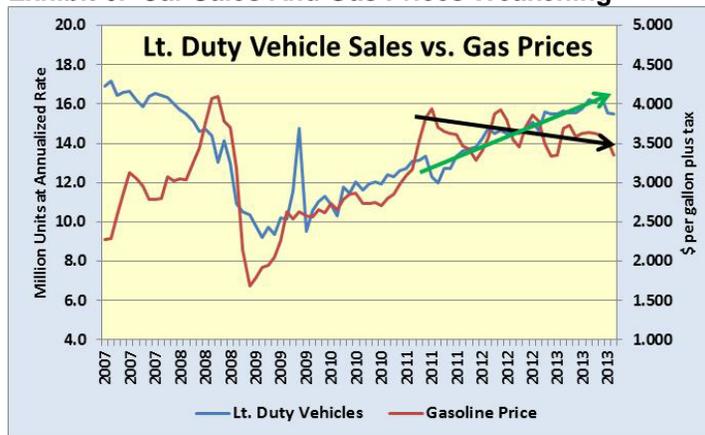


Source: BEA, EIA, PPHB

From the start of 2009 to now, there has been a steady increase in car sales even as gasoline pump prices jumped back up to the \$3.50 per gallon level

New-car sales began climbing as the economic stimulus by the Obama administration and the bailout of the auto industry boosted people’s willingness to purchase new cars. When one looks at the new-car line in the graph, they can clearly see the impact of the “clunkers” stimulus program. From the start of 2009 to now, there has been a steady increase in car sales even as gasoline pump prices jumped back up to the \$3.50 per gallon level. So the conclusion to be drawn is that low gasoline pump prices do have a positive impact on new-car sales. Since 2000, however, the relationship between gasoline prices and new-car sales seems to be changing, suggesting maybe other factors are at work.

In order to gain a better gauge on what the recent gyrations in gasoline prices and monthly new-car sales mean, we examined the data for 2007 through October 2013 (Exhibit 6, next page). If we focus on the period since the start of 2011, it is clear the surge in gasoline prices to nearly \$4 a gallon coincided with a drop in new-car sales, but they then responded positively to the subsequent drop in gasoline prices. Although gasoline prices have remained volatile

Exhibit 6. Car Sales And Gas Prices Weakening

Source: BEA, EIA, PPHB

What we find most interesting in the recent data and disturbing, too, are the trends in new-car sales and gasoline prices during the past two months

during the past three years, since they peaked in early 2011, their overall trend has been downward. At the same time, new-car sales trended higher –buoyed by improving consumer confidence, a better economy, readily available automobile credit, cheaper auto leasing programs and an aging car fleet in need of replacement.

What we find most interesting in the recent data and disturbing, too, are the trends in new-car sales and gasoline prices during the past two months. While we recognize we shouldn't be overly alarmist about two data points making a long-term trend, they do establish a line. Both lines are heading down, which, based on the 35-year history of new-car sales and gasoline prices, seem unusual. Does this suggest other factors are having a greater impact now such as the debate over the federal deficit and spending that led to the government shutdown? Or is it possible we are beginning to run into a wall on the "need" factor driving new-car sales? Maybe consumers are more impacted by the lack of real improvement in the labor market – part-time jobs just don't cut it financially to purchase a new car and impending benefit cuts also hurt. While we don't have answers, the recent trend in new-car sales is somewhat troublesome, much like the slow pace of homebuilding, since both industries significantly impact energy demand.

Another Oil-Train Wreck Draws Attention To Industry Safety

This oil-train accident was just as spectacular, although not as deadly, as the Lac-Mégantic accident in Quebec province

On the morning of November 8, rural Alabama was the site of a spectacular oil-train derailment that resulted in a fire that burned for two days. This oil-train accident was just as spectacular, although not as deadly, as the Lac-Mégantic accident in Quebec province earlier this fall. The train was operated by Genesee & Wyoming Inc. (GWR-NYSE), a short-haul railroad that is the primary connection between main rail line companies and the refinery and oil terminal facilities. The train was being operated on the Alabama & Gulf

Both trains were carrying crude oil from the Bakken in North Dakota that tends to be very low-density, or “light” oil, meaning it contains more volatile compounds that may account for its explosive properties

Coast Railway, one of 45 short-haul lines recently purchased by Genesee. The operating conditions around the 90-car Genesee train were considerably different from those in the Canadian accident – it was on relatively flat terrain; traveling below the 40 miles per hour (mph) speed limit; not parked on an incline where brake failure may have been a factor; driven by the industry-standard of two engineers instead of one; the tank cars were T108s and not DOT-111s that have been faulted by regulators for safety problems; and the track had recently been inspected finding no defects. Both trains were carrying crude oil from the Bakken in North Dakota that tends to be very low-density, or “light” oil, meaning it contains more volatile compounds that may account for its explosive properties. The crude quality similarity does not explain the reason for the 30 car derailment, however.

Exhibit 7. Impact Of Unit Trains For Oil

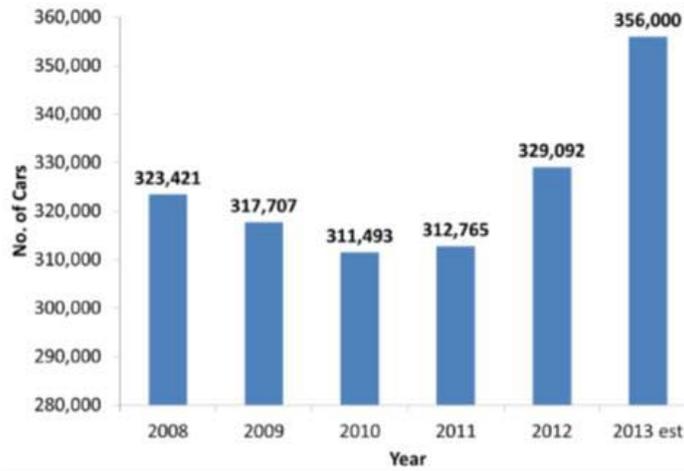


Source: Union Pacific

Unit train tank cars are estimated to travel up to 60,000 miles a year while manifest cars only travel about 20,000 miles, another measure of why unit train tank cars require more frequent inspection

The dramatic growth in oil-by-rail traffic is raising safety concerns, especially given these spectacular and deadly accidents. According to the Association of American Railroads, there will likely be 400,000 tank carloads this year up from 4,700 carloads in 2006. While attending a seminar on crude oil by rail, we were surprised to learn certain facts about rail tank cars and moving oil by rail. To handle the growing oil output, the industry has turned to unit trains – a large number of rail tank cars in a dedicated train moving from the loading point directly to the delivery point, as opposed to tank cars being a part of a traditional freight train, which is known as manifest. Unit trains travel at a slower average speed – 50 mph versus 60+ mph – than regular freight trains. Tank cars used in unit trains are inspected more frequently because they experience greater wear and tear than manifest tank cars. That is probably because freight trains sit a lot as they are assembled and disassembled. Unit train tank cars are estimated to travel up to 60,000 miles a year while manifest cars only travel about 20,000 miles, another measure of why unit train tank cars require more frequent inspection. All tank cars need to be recertified every ten years. The growth in oil by rail is demonstrated by the growth in Union Pacific Corporation’s (UNP-NYSE) unit car volume.

**Exhibit 8. Oil By Train Reflected In Car Fleet
Total North American Tank Car Fleet**

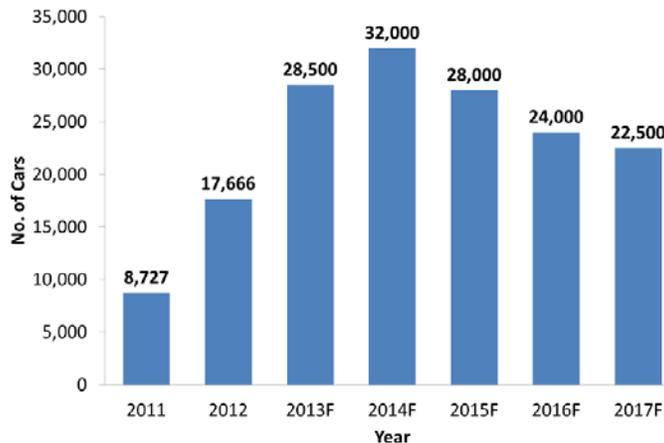


Source: Union Tank Car Company

The tank car builders have proposed new safety standards for the older tank car design (DOT-111) but retrofitting the older ones is limited by their design and a lack of industry repair facilities

Crude oil by rail has grown dramatically in recent years and, based on the backlog of new tank cars, the growth will continue. There are a number of safety issues with tank cars, especially the older ones that were not built to the same safety standards against puncture or explosion. The tank car builders have proposed new safety standards for the older tank car design (DOT-111) but retrofitting the older ones is limited by their design and a lack of industry repair facilities. The tank car builders have estimated that it would cost over \$1 billion to retrofit the older tank cars, so replacing them with new, safer cars is the more likely approach.

**Exhibit 9. New Tank Car Orders At Record Level
Total New Tank Car Production (2)**



Source: Union Tank Car Company

The other safety area receiving increased industry attention is the condition of the track. The Alabama accident occurred near a 60-

Steel wheels on steel tracks is a 150-year old technology and not likely to change

foot-long, 10-foot-high wooden trestle. These trestles are subject to rotting and movement. There has been no determination whether this trestle was the cause of the accident. Steel wheels on steel tracks is a 150-year old technology and not likely to change. The rail industry is employing sonic inspection of rail lines seeking to find cracks in the steel that might separate and cause derailments when under stress. There is little doubt the rail industry and its tank car suppliers will come under increased safety scrutiny and new regulations, all of which will boost the cost of moving oil by rail. The recent rash of pipeline accidents will have the same impact on their operating costs as the train accidents. The bottom line is that the cost of petroleum transportation in the U.S. will be heading higher.

Update On China's Third Plenum Meeting And One-Child Policy

The communique issued following the plenum was general in its description of the actions the leaders had agreed upon

As we wrote in our last *Musings*, the Third Plenary Session of the 18th Communist Party of China Central Committee was held two weeks ago and spurred keen interest from outside observers attempting to divine the future course of the country's economic and political policies. We suggested that the 3rd Plenum session was usually held at the end of the second year or early in the third year of the five-year reign of the Party leadership. It is at this session, once the organizational structure of the party is established, that future economic, social and international policies are set forth for government officials to begin implementing. The communique issued following the plenum was general in its description of the actions the leaders had agreed upon. In response to the questioning reaction, media reports suggest that a more detailed plan description was rushed out more than a week ahead of the document's originally anticipated unveiling.

The initial plenum communique touched on virtually all the topics China observers expected including centralizing control of the state by taking power away from local governments and allowing ministries to flex their muscles, and upholding the role of markets to achieve efficiency and fairness

The initial plenum communique touched on virtually all the topics China observers expected including centralizing control of the state by taking power away from local governments and allowing ministries to flex their muscles, and upholding the role of markets to achieve efficiency and fairness. Specific policy changes include nationalizing the basic pension system, ending the one-child policy and labor camps, setting up the new State Security Committee and a team for deepening reform, vertically integrating courts, procuratorate and party disciplinary units, pushing reform of letting counties report to provinces directly by reducing the intermediate governmental level, upholding the role of markets, promising to protect private property rights, and giving farmers better rights in trading their non-farm lands. There were a number of other administrative and governmental structural changes announced, too.

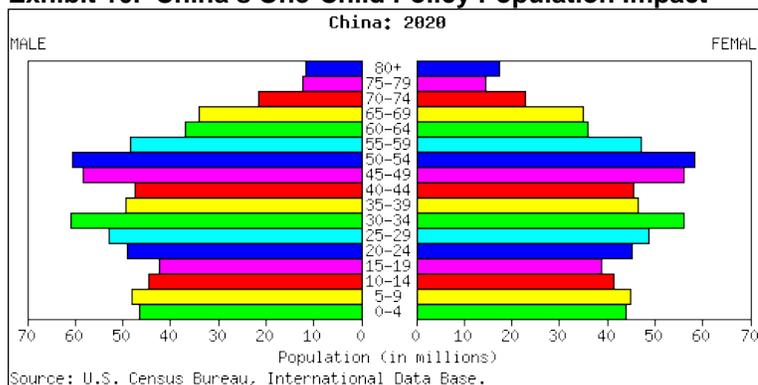
There was considerable attention paid to the decision to change the one-child policy, which has been detested by people within China and outside. The new policy will allow couples in which one of the parents is a singleton (only child) to have a second child if they desire. Some people view this change as a liberalization of a social

China’s 2005 population survey identified singletons as accounting for 29.3% of all Chinese aged 30 or under, which represents the population segment impacted by the one-child policy that went into effect in the late 1970s

policy that is exacerbating the country’s labor market and possibly sowing the seeds of discontent due to the imbalance of single men and women due to parents favoring sons over daughters. A quick analysis of the policy’s change on the population suggest it will do little to change the underlying demographic and labor force challenges facing China starting in 2015.

China’s 2005 population survey identified singletons as accounting for 29.3% of all Chinese aged 30 or under, which represents the population segment impacted by the one-child policy that went into effect in the late 1970s. We will assume the ratio of singletons is significantly higher in urban areas, where enforcement of the policy was stronger, say 50%. The current census data points to 79 million women of child-bearing age (23 to 42 years old), meaning there are 39.5 million women who might be eligible to have a second child. If we assume 25% of them decide to have another child, there is a potential for another 10 million births. Obviously, not all the eligible women we have identified will decide to have their second child at the same time, so the incremental births will occur over the next couple of years.

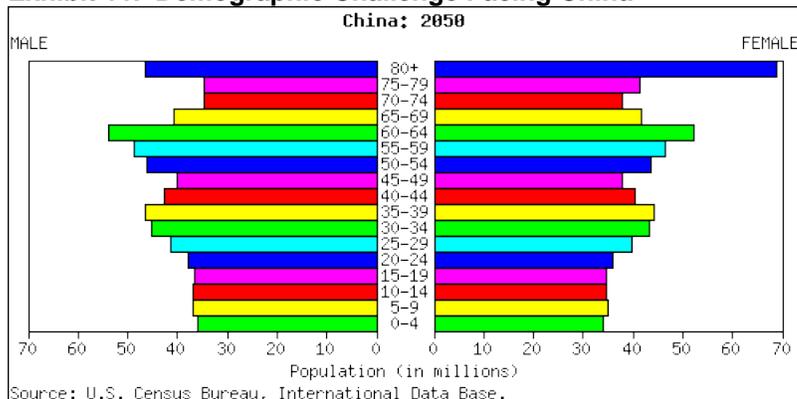
Exhibit 10. China’s One-Child Policy Population Impact



Source: Census Bureau

If the 10 million children are split 50/50 male/female, then the 5-9 year old segment would grow to slightly over 50 million males and about 50 million females

How might the changed child policy impact China’s demographics? If we assume the extra 10 million children are born over the next two years, by 2020 they would be in the 5-9 year old slice of the population pyramid, with the 0-4 year old slice also being larger. If the 10 million children are split 50/50 male/female, then the 5-9 year old segment would grow to slightly over 50 million males and about 50 million females. While a positive for the future, that expanded age group will remain much smaller than the 30-34, 45-49 and 50-54 age groups – the ones most impacting the aging profile of China’s population.

Exhibit 11. Demographic Challenge Facing China

Source: Census Bureau

In our view, all the economic and governmental reforms cannot overcome the economic and possibly political effects of the aging of China's population

If one looks at the current 2050 population pyramid for China, the impact of the one-child policy on the demographics is clear in the small base of younger age groups supporting top-heavy older generations. If one envisions an extra five million added to each of the male and female sides of the pyramid for all age groups from 30-34 down, the demographic profile doesn't look quite as top-heavy, but the country still faces an imbalance in its labor force age group. In our view, all the economic and governmental reforms cannot overcome the economic and possibly political effects of the aging of China's population. It will impact the country's future energy needs, we just don't know to what degree.

Petrobras Peru: A Tale Of Two Countries In Need Of Oil

The Peru unit owns interests in three oil fields that currently produce 16,000 barrels a day

On November 13, Petrobras (PZE-NYSE) announced it entered into an agreement to sell all the shares of its Petrobras Energia Peru S.A. subsidiary to affiliates of PetroChina (PTR-NYSE), controlled by China National Petroleum Corporation, for \$2.6 billion. The Peru unit owns interests in three oil fields that currently produce 16,000 barrels a day. The deal must still be blessed by the Chinese and Peruvian governments, but given the state of development of these fields and their potential, we don't see that being an issue.

The real story of the Brazil and China relationship, however, is about two countries, both in need of more oil to fuel their economies and directed by their respective governments to secure those supplies, but one country has money while the other doesn't

This transaction follows on the heels of another deal in October, in which China National Petroleum and CNOOC Ltd. (CEO-NYSE) each secured 10% shares in a consortium of oil companies planning to develop Brazil's largest offshore oilfield, Libra, that is estimated to hold between eight billion and 12 billion barrels of recoverable oil but lies below layers of salt deposits offshore Brazil in more than 6,000-feet of water and at a total drilling depth of nearly 21,500-feet. The real story of the Brazil and China relationship, however, is about two countries, both in need of more oil to fuel their economies and directed by their respective governments to secure those supplies, but one country has money while the other doesn't.

This trend highlights the challenges of the oil and gas business – it is highly capital intensive; cash returns are often well in the future; finding and development costs relentlessly rise squeezing profits; the industry is viewed as a “honey pot” for tax revenues by governments; and companies must hope commodity prices do not fall before production commences

It seems China is playing the Warren Buffet role of capitalizing on a solid business caught in a distressed situation, and its move will probably prove equally as profitable as the Oracle of Omaha’s record

Just as we are seeing in the prolific U.S. shale plays, operators in need of cash to develop their holdings are being forced to sell other properties or seek additional capital from Wall Street, private equity funds or other industry players. This trend highlights the challenges of the oil and gas business – it is highly capital intensive; cash returns are often well in the future; finding and development costs relentlessly rise squeezing profits; the industry is viewed as a “honey pot” for tax revenues by governments; and companies must hope commodity prices do not fall before production commences. What we also know about the oil and gas business is that it is cyclical. As one CEO put it, “Remove the cycles and this is a pretty boring business.” One hates to think that industry and economic cycles are what attract and stimulate executives in this business, but working in the industry carries a certain amount of tension, like driving a race car at 150 miles per hour.

There are various lessons we can learn from this Brazilian transaction. When governments control oil and gas prices, either directly through price caps designed to control inflation in the country, while at the same time dictating that its national oil company buy locally-manufactured equipment and employ locally-controlled service companies, the ability to control costs and the timing of investment are lost – key requirements for success in this business. These governing mandates create outstanding opportunities for investors with capital to invest to buy attractive assets at distressed prices. For an opportunistic investor seeking to secure oil and gas resources, the current energy policies of Brazil have handed China a golden opportunity to secure high quality oil assets at an attractive long-term value. It seems China is playing the Warren Buffet role of capitalizing on a solid business caught in a distressed situation, and its move will probably prove equally as profitable as the Oracle of Omaha’s record.

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