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Portfolio Insight

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The Case for Natural Gas Now

The US faces a myriad of well publicized problems. A fragile domestic economy, high levels of unemployment, and burgeoning budget and trade deficits weigh heavily on the minds of investors and affect the long-term outlook for our standard of living. Good news is rare in this environment. Still, we believe recent innovative changes within the energy industry offer hope to address some of our nation's persistent problems.

The landscape of the oil and gas industry is changing as a revolution has taken place in America's natural gas fields. Recent advances in hydraulic fracturing and horizontal drilling technologies have unlocked deposits of shale gas once thought of as economically out of reach. The production of natural gas from shale rock is now one of the lowest cost sources of natural gas in the US and has increased potential reserves to almost 100 years worth of consumption. Natural gas has historically traded at a discount to oil, though increased gas production has recently driven the price of gas to extraordinarily low levels relative to oil. Currently a barrel of oil in natural gas terms is about $30 or about 60% cheaper. Acknowledging this new era, ExxonMobil has predicted that natural gas will be the world's fastest growing fuel source through 2030.

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Meanwhile, US oil production peaked in the 1970's; we now import about 60% of our annual oil consumption, the cost of which represents *roughly half of our trade deficit*. In addition, mounting financial and human costs associated with ongoing conflicts in the Middle East added to the Gulf of Mexico oil spill highlight the inherent risk of our addiction to oil as a transportation fuel. This is hardly a new problem. In fact, it is decades old, but until recently we have not had many viable options for a solution. Natural gas appears to offer part of the answer for our energy future as an abundant, clean, cheap and domestic fuel source. In combination with energy conservation and the adoption of electric vehicles, increased use of natural gas for electricity generation and transportation can help reduce dependence on imported oil, lower the trade deficit and cut carbon emissions.

Abundant:
The increase in reserves and production of natural gas is driven by advances in horizontal drilling technologies, 3D seismic imaging and hydraulic fracturing of unconventional resources such as shale rock. The existence of oil and gas in low-permeability shale, in some cases miles underground, has been known for decades. Only recently has the advance in gas-production technology enabled economic production and created the abundance of natural gas in the US.

As recently as seven years ago, there were grave concerns that the US was entering a period of low gas supplies. Alan Greenspan testified before Congress in 2003 that shortages of natural gas might impair the economy. Fears emerged that we would become reliant upon imported gas via LNG (liquefied natural gas) much as we are currently dependent on imported oil. Now, with the advent of low-cost shale gas, it appears that we may have almost a century of supply according to several recent studies. Gas production continues to rise and just last year the United States surpassed Russia as the world's largest producer of natural gas. Highlighting the now widely recognized abundance of natural gas in the US, a port terminal designed to import LNG into the country recently announced its intention to invest billions to build liquefaction capabilities to **export** LNG.

Clean:
Natural gas is by far the cleanest burning fossil fuel. It produces 50% of the carbon dioxide of coal and 30% less than gasoline while emitting significantly less sulfur dioxide, nitrogen oxide, and particulate matter. Importantly, natural gas does not emit toxic metals such as mercury which is an undisputed drawback of coal combustion. Onshore production of natural gas is environmentally safer when accidents occur. The blowout of a natural gas well requires

igniting the gas to flare it and then shutting in the well. The resulting pollution has far less damaging environmental consequences than oil production. The BP Macondo well disaster in the Gulf of Mexico clearly illustrates the potential magnitude of oil-related accidents.

"US oil production peaked in the 1970's and as a result we import about 60% of our annual oil consumption, the cost of which represents roughly half of our trade deficit"

As with most issues related to the energy industry, production of natural gas from shale deposits is not without controversy. Hydraulic fracturing (often called simply fracing, but pronounced "fracking") involves pumping millions of gallons of water, sand and chemicals into a well bore at extremely high pressure to fracture the rock so that natural gas can emerge. Prominent among environmental concerns are that fracing fluid could enter and spoil freshwater aquifers and that water produced in the process will not be properly disposed of. The industry has seen many cases of the latter where companies mishandled water from gas wells and polluted rivers and streams. However, the record on the former is virtually spotless with no contamination of aquifers from fracing. Part of the reason is that shale gas deposits are one half to several miles below ground while freshwater aquifers typically exist only several hundred feet below the surface. There are efforts in Congress to force companies to disclose the components of fracing fluid. The vast majority of US gas wells require fracing, so the imposition of extreme limits could be significantly disruptive to domestic gas production. We view severe limits such as an outright ban highly unlikely.

Economic:
Finding costs of shale gas are on the decline. Over the past decade the industry has lowered the cost of production with technological advances so that the breakeven cost for a typical shale well dropped from $6-7 per MCF (thousand cubic feet) in the 1990's to about $3-4 today. The geology, infrastructure and type of gas dictate the economics of development, and some oil-rich gas plays are essentially "free" after selling the associated liquids.

Carbon legislation is another dynamic that will improve the relative economics of natural gas. Carbon legislation was passed by the House of Representatives in 2009, and a Senate bill that seeks to curtail CO_2 emissions is pending. Either a carbon tax or a "cap & trade" system will require power plants and industrial concerns to reduce carbon pollution that scientists claim is causing climate change. Since coal provides approximately half of our electricity production while emitting toxins and twice the carbon of natural gas, the coal industry will feel the brunt of carbon policy. Natural gas should benefit from carbon legislation and the more draconian the rules, the bigger the benefit. The higher post-carbon cost of coal will shift the playing field and increase natural gas usage for electricity generation. In this regard, natural gas is finally gaining respect as a bridge fuel to a clean energy future.

The economics of shale gas production are another source of controversy within the industry. Shale gas skeptics point to high production decline rates that obscure the economics of shale gas. Typical shale wells decline 60-80% in the first year, and depending on the economics, break even after half a year to four years. The long-tail of production determines the estimated ultimate recovery of the well and total return on investment. Certainly, lower quality acreage will have marginal economics and lower returns, like any conventional gas field.

Potential US Demand:
Natural gas demand has remained stagnant in the United States over the last 40 years. Increases in residential heating demand and power generation have offset declines in industrial demand. With an abundance of cheap natural gas, there are several growing markets which could increase demand. Gas-fired generation could replace marginal coal-fired generation because the gas-fired generation fleet currently operates significantly below capacity. Natural gas generation is also an ideal choice for backing up intermittent renewable electricity sources such as wind and solar due to the ability to quickly ramp up output. Gas-fired plants are a relatively inexpensive generation technology, and the growth of electric cars could ultimately increase domestic electricity demand load, requiring new capacity to be added.

Transportation is a potential area for increased natural gas usage. Historically, natural gas has played a de minimis role as a transportation fuel in the US. One MCF of natural gas has the same energy as seven gallons of diesel fuel. At current prices, natural gas costs less than $1 per gallon to fuel a vehicle. The fact that natural gas is now 60% cheaper than gasoline or diesel is driving interest in re-powering certain US fleets to take advantage of natural gas as a vehicle fuel. Internationally, several countries have embraced natural gas vehicles. Argentina, Pakistan, Brazil and Iran each have one to two million gas powered vehicles already on the roads. In the United States, refueling infrastructure is based on diesel and gasoline with less than 1,300 offerings of compressed natural gas (CNG). Fleet vehicles that return to a base such as delivery trucks, service vehicles and municipal vehicles, are a first step towards wider adoption. Legendary wildcatter T. Boone Pickens' support of this view with his "Pickens Plan" helped push a natural gas bill before Congress. The NAT GAS Act is currently pending in both the Senate and the House and would mandate that 50% of government vehicles be powered by natural gas by 2014 and provide incentives for the private sector to gradually introduce natural gas as a replacement for diesel fuel.

How are we invested in natural gas?
Natural gas producers:
With the US natural gas industry in oversupply, a danger exists in owning higher cost producers. The low cost producers in a commodity industry often retain significant competitive advantage. Companies with a lower cost advantage will exhibit higher returns on capital and typically remain profitable even in a low price environment while higher cost producers are forced to cut back spending and production. We believe the discovery of shale-based gas in several basins of the US has altered the competitive dynamics of the industry. Accordingly, we are focused on owning companies that exhibit industry leading low-cost structures and ample growth opportunities.

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Energy Services: Global energy companies are dependent on the technology of energy service companies to find, develop and enable production from shale and other unconventional resources. We continue to believe the outlook for energy services remains attractive over the long-term as discoveries are increasingly more difficult to produce. New reservoirs are found in deeper, hotter, higher pressure and often harsh environments. This trend is increasing the capital intensity of exploration. The trend towards unconventional gas development is also increasing the service intensity of production. Shale wells drilled horizontally have about three times the service intensity of a conventional land well drilled vertically. Unconventional development of shale and tight sand gas formations require dozens of frac stages and higher technology completion methods than conventional gas wells.

The US may have unlocked the secret to economic shale gas production. However, shale is a common sedimentary rock found in most countries, so the revolutionary potential of shale gas should spread globally. Nations like Poland and other eastern European countries are aggressively pursuing shale deposits to reduce their dependence on imported gas from Russia. China's national oil company, Petrochina, estimates that China's shale gas reserves may eclipse all of Russia's proven conventional gas reserves. China was an oil exporter years ago but has more recently become a major importer of both oil and LNG. With the help of international energy service companies, shale gas developments may significantly reduce China's LNG import demand. Just in the past two years, international energy companies have invested over $15 billion in shale development joint ventures with independent gas producers in the United States. These investments ostensibly are to gain exposure to the growth of US shale gas but also are aimed at acquiring a degree of expertise to export to their home countries.

It should be noted that the majority of global contracts for LNG or pipeline gas are indexed to the price of oil, currently 2-3 times the price of US natural gas. Less developed countries have a strong incentive to develop shale gas to free themselves from dependence on expensive imported gas. This process has interesting geopolitical consequences in reducing the power of major gas exporters such as Russia, Iran and Algeria. The global energy service companies in effect become "arms dealers" in the battle to provide energy independence and commitments to these companies continue to be a meaningful part of our energy investment strategy.

Electricity Generation: We are structurally biased towards investing in companies engaged in gas-fired generation over coal-fired generation. Pending Federal carbon dioxide legislation should benefit natural gas generators. US generation capacity is projected to tighten over the next few years. New nuclear plant expansions will not arrive until 2015 at the earliest. The economic and environmental concerns of clean coal plants are pushing back the addition of new coal fleet capacity. Thus, gas-fired power plants should benefit from incremental electricity demand for the foreseeable future, driving fleet utilization higher. As capacity margins tighten, gas generation will see pricing and utilization increase, enhancing profitability.

Summary:
The energy industry is undergoing a revolutionary change that is lowering the cost of natural gas production. Given the changing landscape, we are committed to investing in the lowest cost and highest-growth gas producers. The technological advances that created the abundance of gas in the US are spreading worldwide, so we are invested in global energy services companies. We are also invested in the beneficiaries of low-cost natural gas such as gas-fired generators.

We believe that in addition to energy conservation and the adoption of hybrid and electric vehicles, the increased use of cheap and abundant natural gas for electricity generation and transportation can help the US reduce its dependence on imported oil, lower the trade deficit and cut carbon emissions.