

AN ENERGY REVOLUTION IS UNDERWAY

Traditional energy sources like oil and natural gas are critical components and requirements for our way of life today. It will take a long time to offset our traditional energy needs with other sources, which leaves opportunity for traditional energy in North America.

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INTRODUCTION

There is much discussion about energy today. Whether it is the rising price of oil and gasoline, military action and regime changes in the Middle East, a massive oil spill in the Gulf of Mexico, the nuclear crisis in Japan, or President Obama speaking to the American people about reducing our dependence on foreign oil – two things are clear:

1. *We continue to consume a great deal of energy resources, and*
2. *This is very unlikely to change anytime soon.*

Yes, we can all do our part to reduce our energy needs. Hybrid and electric vehicles are becoming more commonplace, and will continue to evolve, improve, and garner a larger share of the global automobile industry in the coming years. Battery technologies are increasingly more viable in a broad range of applications. Solar and wind power continue their race to reduce costs in an effort to become viable, economic energy sources without the need for government subsidies. While all of these and other alternative and/or clean energy efforts are important, the fact still remains that traditional energy sources such as oil and natural gas are critical components and requirements for our way of life today – and it will take a long time to offset our traditional energy needs with other sources.

It is clearly true that the United States consumes a great deal of oil and natural gas, and that much of our oil comes from foreign sources today. In fact, the U.S. consumes about 19.3 million barrels of oil per day, or about 22% of the estimated 89.2 million barrels consumed each day in 2011, globally. Further, we import about 70% of our oil needs in the U.S. today. Just recently, President Obama publicly stated his goal of reducing America's foreign oil needs by one-third over the next 10 years – a sizable goal. Global demand for oil is expected to continue to grow by about 1.5% to 2% per year in 2011 and 2012. Importantly, global oil supply will be challenged to keep up with the growing demand, as producing oil fields are estimated to decline 4% to 6% per year.



Accordingly, the International Energy Agency (IEA) estimates that about half of the conventional oil production needed by the end of the decade has yet to be developed or discovered. To meet this challenge, an estimated \$450 billion will need to be invested each year in oil and natural gas exploration and production activities.

Fortunately, North America is a land of natural resources, and with advances in technology in recent years, major oil and natural gas discoveries have been made in America, and we now have the technology and capability to utilize these emerging energy resources, and grow America's domestic energy production.

OLD ONSHORE OIL AND GAS FIELDS PROVIDE NEW GROWTH OPPORTUNITIES

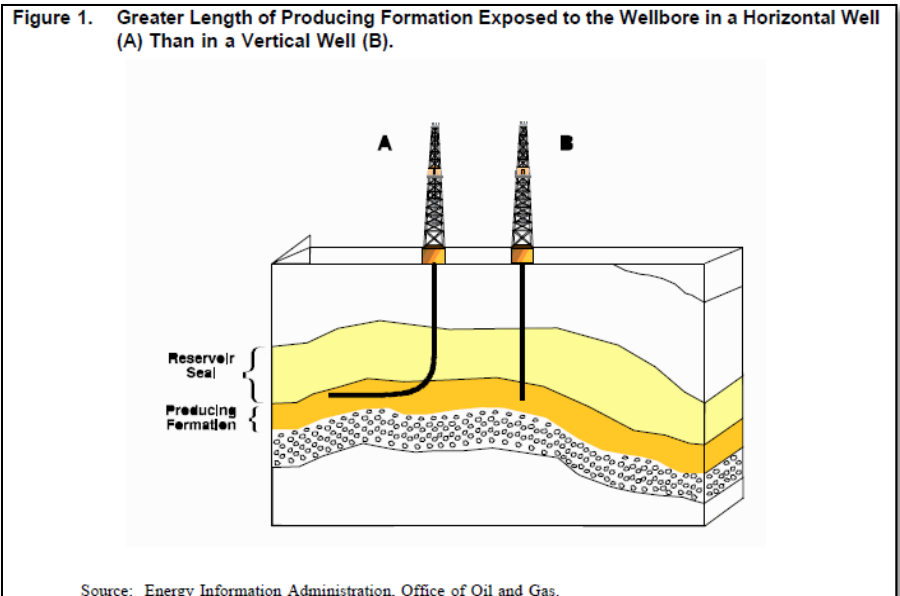
Technology Advances Make It Possible!

In 1995, the U.S. Geological Survey stated that “potential for additional discoveries in this play is limited by extensive previous drilling” – referring to the Spraberry Field, a large portion of the Permian Basin in West Texas. Oil and gas producers have been drilling in the Spraberry Field since the 1950s, and the field has not been considered an exciting growth area...until recently.

With substantial advances in technology, the Permian Basin has once again become a growth opportunity for oil and gas exploration and production, or E&P, companies who hold the right land positions. Two key technical advances making this possible are **horizontal drilling**, and **multiple-stage fracture stimulation**.

As its name implies, horizontal drilling enables producers to drill to a desired depth, and then drill horizontally – which allows the drilling of long distances at a given depth, to access thin oil and gas deposits that cover a large area. Accessing these types of deposits was either very difficult or impossible with traditional vertical drilling technology.

Horizontal drilling is now used to develop large, but difficult-to-reach natural gas discoveries in places like the Haynesville and Barnett shale gas fields in the U.S., as well as oil formations in the Bakken and Eagle Ford resource plays, among others, in the last few years. The cost, however, is much higher for horizontal drilling, with the most complex wells costing \$7-8 million each, while today's advanced vertical drilling efforts are in the \$1.4-1.5 million range. In formations where the amount of oil and gas is sizable, the economics are very favorable for horizontal applications. Today, roughly 75% of all active rigs in the U.S. utilize horizontal drilling technologies, versus only 35% ten years ago. As new resource formations are increasingly the targets of new exploration and production efforts, horizontal drilling is likely to continue to represent the vast majority of new E&P efforts in the U.S. and globally.

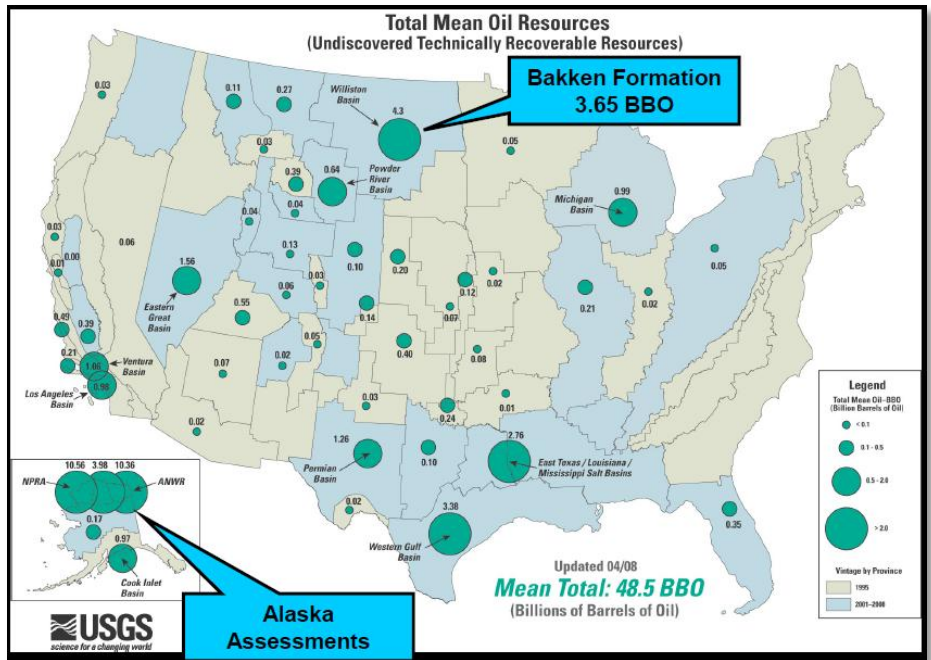


Multiple-stage fracture stimulation (or “multi-stage frac”) technology is another major technology development in accessing these historically difficult-to-reach deposits. Fracture stimulation is the technique producers use to free the oil and/or natural gas from the formation. In many cases, the oil and/or gas is trapped in these formations within another material. “Shale” – a fine-grained sedimentary rock composed mostly of clay and silt – is a commonly found type of formation in many oil and gas resource plays. In simple terms, once the well is drilled, fracture stimulation is the next step, allowing the oil and gas to flow to the surface. In wells with long lengths of horizontal drilling, multiple frac stages are increasingly utilized, with the more complex wells reaching as many as 25 to 30 frac stages.

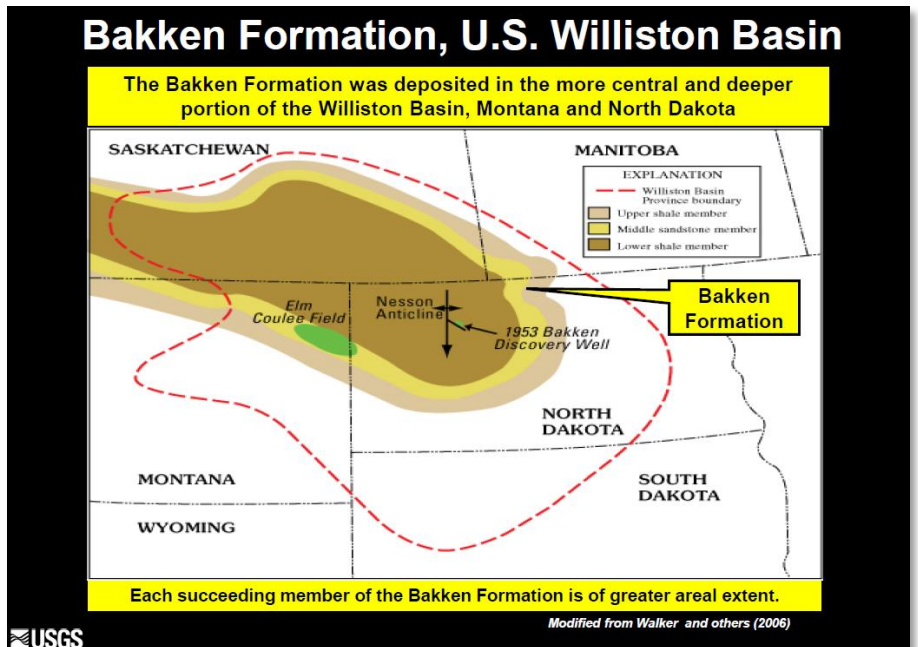
Of course, vertical drilling continues to be very important, and has also added new technology. Some new vertical drilling efforts include “commingling” multiple reservoirs by drilling through multiple formations (at different depths) and using multiple fracture stimulation stages to access oil and gas from multiple depths.

The U.S. Geological Services, part of the Department of the Interior, published the following map of the major known and assessed oil resources in the U.S. – but only the resources that it deems technically recoverable. With the adoption of complex horizontal drilling technology and other capabilities, the opportunity to recover oil and natural gas from previously “unrecoverable” deposits, is becoming a reality.

The Bakken formation in the Williston Basin spans parts of North Dakota, Montana, and Saskatchewan, Canada. Oil producers have explored the Williston Basin in North Dakota for decades, with the first Bakken discovery occurring in 1953.



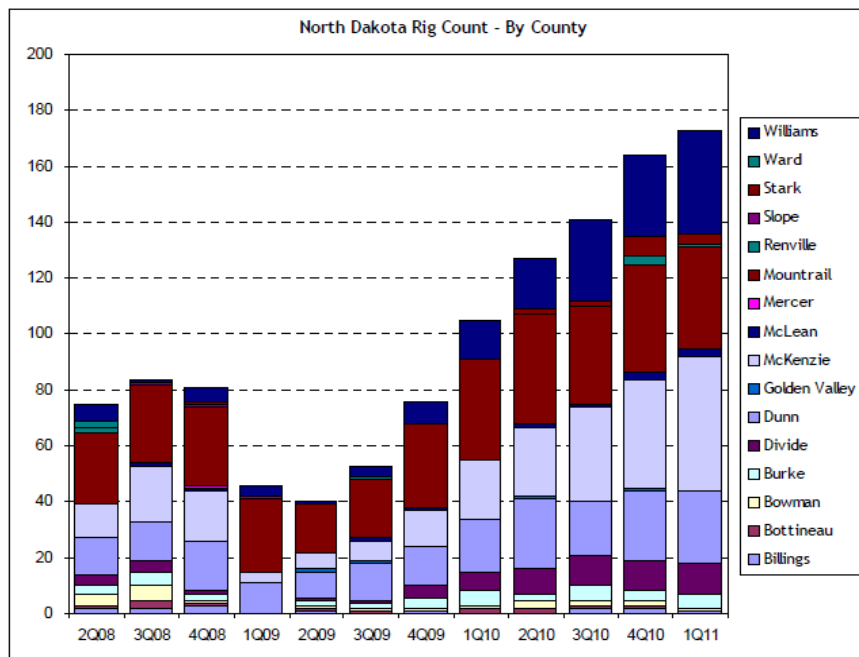
However, in 2008, the U.S. Geological Survey (USGS) released its newest assessment of the area, stating that there are between 3.0 and 4.3 billion barrels of technically recoverable oil in the Bakken formation and associated plays in the Williston Basin – which makes it the largest find in the lower 48 states. This new assessment is up twenty-fivefold from the USGS's 1995 estimates – largely due to advances in technology, drilling and well completion techniques.



As a result, there has been a massive effort to acquire land positions and to implement advanced horizontal drilling technology to produce oil from the Bakken formation, and more recently, the Three Forks formation, which lies underneath the Bakken.

This region is currently undergoing a massive ramp in drilling activity, with the number of drilling rigs in North Dakota skyrocketing by more than a factor of four, from the low point of 40 rigs in 2009, to the current level of 173 rigs. As a result, oil production is growing quickly, and will likely continue to grow in the coming years.

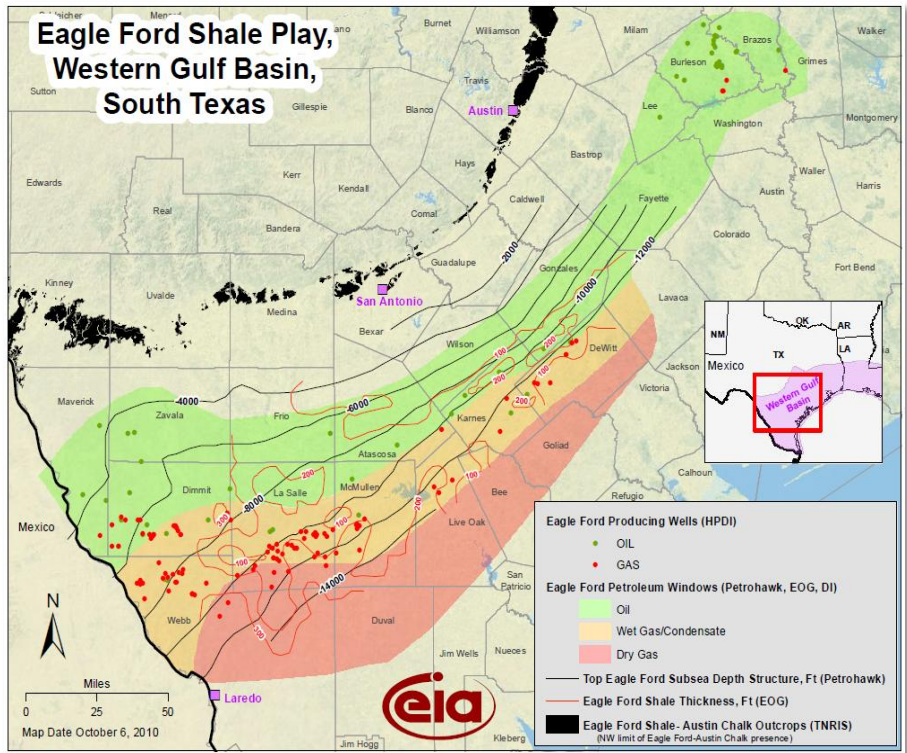
Exhibit 6: North Dakota Rig Count - By County



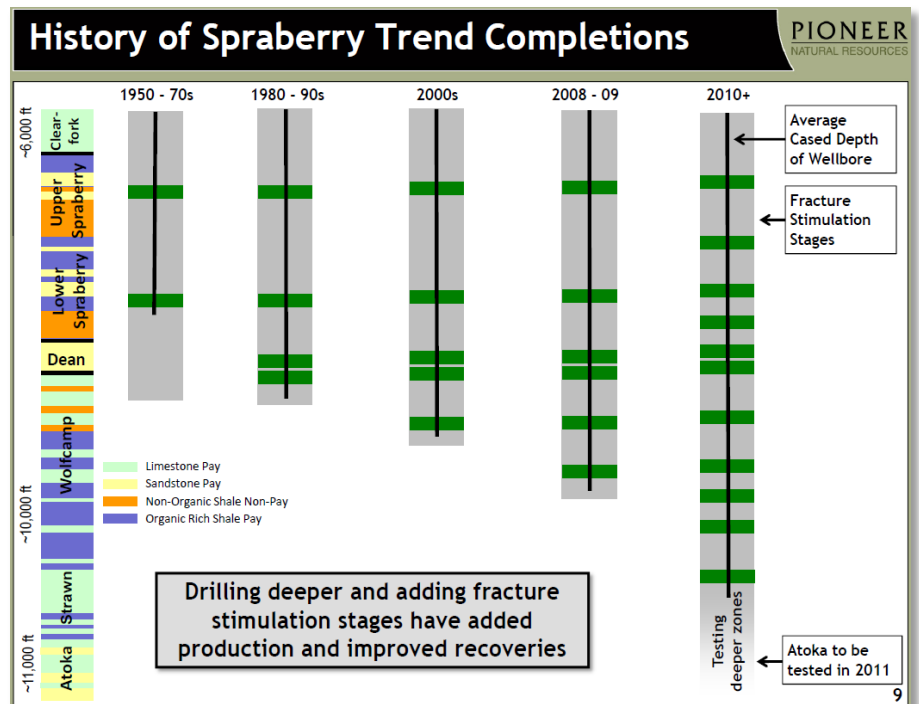
Source: North Dakota Industrial Commission, Company Reports and RBC Capital Markets estimates.

In the Eagle Ford shale play, the story is similar – the use of advanced, long lateral, horizontal drilling is driving acceleration in production efforts. Several E&P players are focused on the Eagle Ford shale opportunity, and operators are aggressively expanding their drilling efforts – with some doubling their number of drilling rigs in the area. Current well costs are \$7-8M per well in the Eagle Ford, although oil prices and the economics of the resource play make this a very profitable opportunity.

The Permian Basin consists of about 24 million acres. One of the large resource areas within the Permian Basin is the Spraberry trend. As the slide below shows, E&P companies are targeting deeper resource formations in the Spraberry trend and other plays in the Permian (see History of Spraberry Trend). Going back to the 1950s, operators in the Spraberry area (in this case, Pioneer Natural Resources) have drilled to the shallower resource formations, such as the Clearfork, Upper and Lower Spraberry, and Dean formations. However, with deeper drilling and multiple fracture stimulation stages, operators can now target the resources in the deeper Wolfcamp, Strawn, and Atoka formations in the 10,000 to 11,000+ feet depth range.



This has the potential to significantly expand the amount of oil and gas produced in each well, driving higher revenue and profitability. As these technologies (both vertical and horizontal drilling) are increasingly utilized in the Permian, and the production rates remain and/or become increasingly favorable, the Permian-based E&P companies could demonstrate meaningful growth for a number of years.



OTHER OPPORTUNITIES – ONSHORE AND OFFSHORE

The resource formation examples above are several of the key areas experiencing resurgent or new drilling and oil and gas production activity. However, there are other numerous locations in the U.S. and Canada that offer additional opportunity to apply new techniques to maximize the oil and gas recovery. Many of these expanded resource plays are still in the early stages of development and production, which means there are likely many years of production growth to come.

This analysis is true of both onshore and offshore locations. The focus of this paper is the numerous land drilling, or “onshore” opportunities in North America. However, the Gulf of Mexico and other coastal locations represent significant U.S. offshore drilling and production opportunities. Of course, after 2010’s disastrous oil spill in the Gulf and subsequent suspension of drilling activity, it is taking some time to resume and ramp up new offshore drilling efforts in the U.S. Over time, however, offshore drilling – with a focus on deep-water drilling – will remain a key piece of U.S. and North American (and global) oil and gas production for years to come.

CONCLUSION: WHERE ARE THE OPPORTUNITIES?

While there is always debate about the costs (economic, environmental, etc.) and benefits of drilling for oil and natural gas, we expect the traditional energy industry to remain a critical part of the energy equation in the U.S. and globally. As we search for viable alternative energy sources, and as these sources ramp into the mainstream, we will continue to need new and growing sources of oil and natural gas. Importantly, if the U.S. is to truly reduce its dependence on foreign oil in the coming years, there is great opportunity to offset some of this dependence with oil production in the U.S., and North America in general. Accordingly, we see a number of areas that represent interesting investment opportunities:

- **Exploration and Production (E&P)** – The companies exploring for and producing oil and gas are on the front lines, working to grow domestic production. These E&P companies, participating in high-growth resource areas, are interesting candidates for investment.
- **Drilling equipment and services** – Given the advanced technologies discussed in this report, companies specializing in drilling vertically and horizontally are well-positioned to take advantage of the growing production efforts in a number of areas.
- **Offshore drilling** – While not discussed in depth in this report, offshore drilling is a key part of the global production effort for oil and gas.

Offshore drilling is a very complex, technical business, and these companies are key components of the global energy picture.

- **Oilfield services** – There is a long list of services and products required to successfully produce oil and natural gas. From the infrastructure needed in some of these remote drilling locations, to helicopter transportation to offshore rigs, there are many companies leveraged to growing activity in the energy production business.

- **Infrastructure to get oil and gas from the well to the consumer** – Getting the oil and gas out of the ground is only the first step. Transporting the commodity to other parts of the energy system is a very important component – whether it is oil and gas pipelines, rail systems, storage systems, or other “mid-stream” technologies. Companies involved in this part of the industry can benefit from the production growth in many of the regions discussed here.

The energy sector includes a very large, complex set of companies in various industries. With high oil prices, increased production efforts, and growing global demand for oil and natural gas, we expect this theme will continue to present a wide range of interesting investment opportunities in the coming years.

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