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Written by: Mark A Beaver, CFP®

OUR OFFICE:
Philip C Benedict, CFP®
Travis M James, CFP®
Mark A Beaver, CFP®
Ashley A Thompson
Jean B Wilson

the BENEDICT REPORT

6000 Lake Forrest Drive NW, Suite 550, Atlanta, GA 30328-5901 • 770 671 8228 • 770 671 0232 *fax* • 800 678 8227

We presented this topic, ***"America's Next Great Megatrend?"*** *at our October 2011 "LUNCH WITH BENEDICT!" and we thought we should put the information in a* Benedict Report *and send it to all of our clients and friends. We think this is big…that's why we wanted to share it with you. Thanks for reading.*

What is a **megatrend**? A megatrend can be defined as:

> A large, social, economic, political, environmental or technological change that is slow to form. Once in place, megatrends influence a wide range of activities, processes and perceptions, both in government and in society, possibly for decades. They are the underlying forces that drive trends.

What are some previous megatrends that have occurred or still occurring?

- **Population growth** – this has been a huge megatrend that effects many things such as land, climate, water, government resources and schools.
- **Globalization** – this megatrend is the growing global interconnectedness that is reflected in the expanded flows of people, capital, information and goods and services. Our world has become a very global place!
- **Internet/Information Society** – The internet megatrend has changed the way we live our lives, the way we do business and even the way we communicate with each other. This megatrend is probably still in the early stages.

These are just a few examples of megatrends. And megatrends can be either positive or negative. So, what about some negative trends we've seen? There are probably many examples, but let's focus on one huge negative trend for our country:

Our dependence on foreign oil

We can think back when our country realized, probably for the first time, that we were not in control of our energy supply. That was during the energy crisis of 1973. We can almost say we lost our energy independence in 1973.

In October 1973, the U.S. decided to re-supply the Israeli military and the Middle East proclaimed an oil embargo. The price of oil skyrocketed and production cuts were announced. Long lines at gas stations were common as the Government called for a national gas rationing program. There was a legitimate panic throughout the country.

We quickly realized we were not in control…but who was? OPEC (Organization of Petroleum Exporting Countries) was in control of our oil supply. And why? It's simple…because we needed their oil.

Since then…what have we done to change that? The short answer is not much. Actually…we have done a lot… we've created many different departments, agencies, laws, acts and regulations, but not much has changed. We've been promising solutions for decades, but we are importing more oil than ever before.

The U.S. currently spends approximately $300,000,000,000 (that's $300 Billion!) annually on net oil imports. And a large portion of that money goes to countries that hate us!

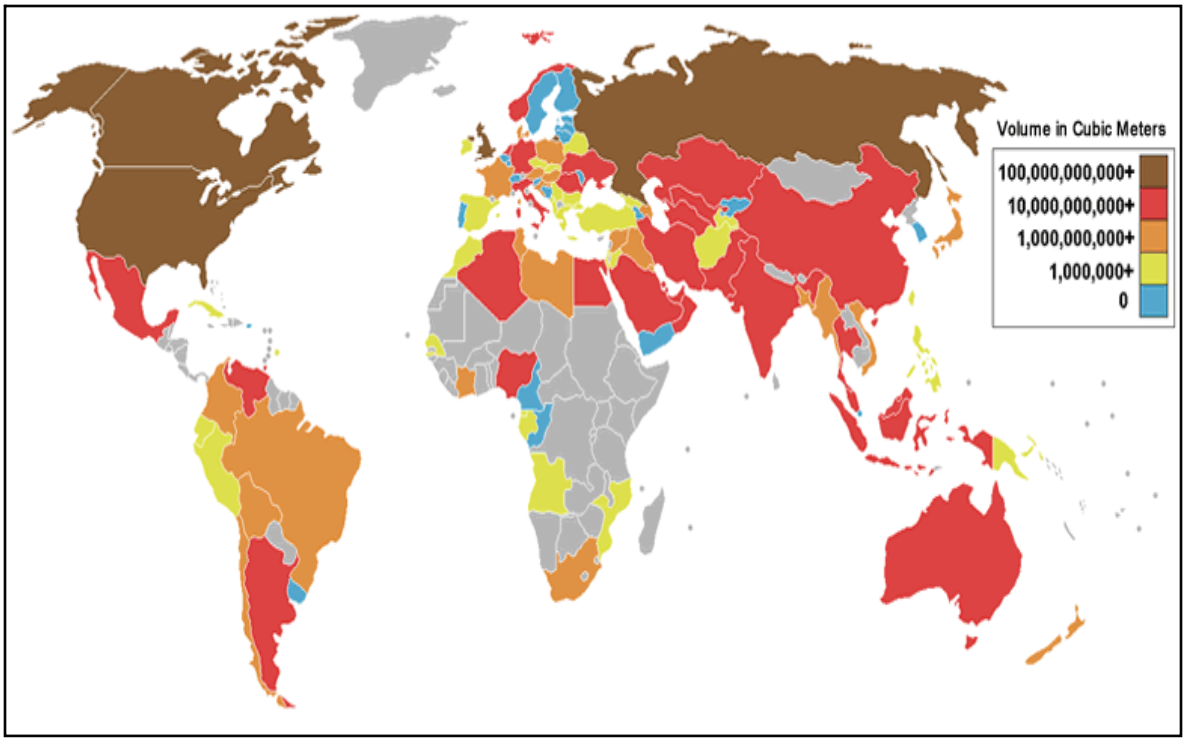
We need "Energy Independence." In fact, America's future may depend on it. So, how can we reduce our dependency on foreign oil and regain our energy independence?

NATURAL GAS

As some of you may have already guessed, America's energy independence will likely come from natural gas.

Before we get into the details, let's look at the big picture and briefly mention the potential global geo-political implications that could arise.

Natural Gas World Map



Source: http://geology.com/oil-and-gas/natural-gas-production-map/

This map shows natural gas production around the world in 2009. As you can see, the dark brown areas represent the most volume of natural gas, which is concentrated in North America and Russia. China, India and a few other countries also have large volumes of gas. But, natural gas is very abundant in North America AND we have the drilling technology to extract it. More on that later…

Now, what do you think some of the Middle Eastern countries might be thinking? Do you think they may be starting to get a little concerned? They could be thinking, "If North America has plenty of gas and can supply South America, and Russia, China and India have plenty of gas and can serve Europe…where are my billions going to come from… Sub-Sahara Africa?"

The great game of geo-political power could be starting to change and the implications could be huge.

WHAT IS NATURAL GAS?

(Mark note – Before I go on, let me say that I'm not an expert on natural gas or an engineer. This information comes from general research and reading on the topic and a few of my own opinions)

Natural gas is a fossil fuel, along with coal and petroleum. Natural gas consists primarily of methane, but other by-products include ethane, propane and butane. Also, natural gas is the cleanest fossil fuel and emits much less of the harmful emissions that come from coal and oil.

In the last few years, vast new resources of natural gas have been discovered in the U.S. Much of this natural gas has been discovered in shale rock formations in certain parts of the country. New technologies have been the driving force behind the discovery of these new shale gas resources. New technologies such as horizontal drilling and hydraulic fracturing (fracking) have uncovered vast new supplies of shale natural gas buried right underneath us.
(Note: Horizontal drilling and hydraulic fracturing are drilling methods that have been around for several decades, but like other technologies, the recent advances have revolutionized the industry)

Rather than try to explain how these technologies work, if you're interested, you can watch educational videos showing the process on www.youtube.com…just type in "horizontal drilling" or "hydraulic fracturing."

U.S. oil service firms are the industry leaders in developing and using this technology to extract natural gas from shale rock. U.S. companies have in-depth drilling knowledge and the most advanced drilling technology for shale natural gas. Thus, this unconventional drilling knowledge and technology could be viewed as some of the most valuable pieces of intellectual 'property' in the world.

Other countries don't have this technology, but they need it! Consider this example:

> *China's largest oil company took 11 months to drill one shale gas well. They decided to contract a U.S. oil service firm to drill the next well, which was completed in just 16 days.*
> [Source: S&A Resource Report , September 2011]

Other countries desperately want and need this technology, and U.S. oil service companies can service the world market.

ENVIROMENTAL ISSUES

I want to at least acknowledge the environmental concerns associated with hydraulic fracturing. There has been a lot of criticism toward 'fracking' and how it can potentially contaminate underground water aquifers. Drilling companies use cement and steel to line the drilling holes before injecting the sand and fluids that are used to "frack," but the potential for damage is there. Some states have even issued temporary moratoriums against hydraulic fracturing until further research can be conducted.

I agree that we need to be aware of the environmental concerns, but more importantly, we need common sense rules and regulations. For instance, we probably need uniform drilling standards across state boundaries instead of each state having their own rules and regulations. This would reduce the regulatory burden on companies operating in multiple states and increase the level of enforcement across the board.

What we need to avoid is "death by bureaucracy." This is too important to our country to become saddled with over-regulation and political stalemates.

Natural Gas Liquids (NGL's)

Natural gas liquids (NGL's) are other chemicals found in natural gas, such as butane, ethane and propane. These liquids are primarily found in 'wet gas', which is natural gas that is mixed with natural gas liquids. This wet gas is the type of gas that is abundant in many of the shale gas regions in the U.S.

Ethane is the second largest component in natural gas. Most people have never heard of Ethane. I know I hadn't before I started researching this topic. But, as you'll see, Ethane is a very important natural gas liquid.

Almost 100% of Ethane is used for one purpose: to produce Ethylene. Ethylene is a very important petrochemical and can be considered a building block of the modern world. You may not know, but many of the products we use on a daily basis contain Ethylene. Ethylene can be found in packaging, diapers, trash bags, toys, pipes, antifreeze, clothing, shoes, detergents, adhesives and much more. Ethylene may play a critical role in the future of manufacturing in this country, which we'll discuss in the next section.

What's the Potential with Natural Gas?

As I mentioned earlier, vast new resources of shale natural gas have been uncovered in this country in the last few years. This abundant new supply has opened the door to some exciting new opportunities. So, what are some of the possibilities that we see? What's the potential?

*** America could become a low-cost manufacturing producer ***

As we just discussed, Ethylene is an important petrochemical and one of the primary building blocks of the modern world because it's used in a wide variety of manufactured products.

Ethylene is currently produced all over the world. In Europe and Asia, ethylene is produced primarily from oil-based products. But, here in the U.S., Ethylene is made primarily from natural gas liquid (NGL) based products, like Ethane. This is why the US could have a huge cost advantage over the rest of the world.

This cost advantage can be explained through the ratio of oil *vs* natural gas.

When the ratio is high, like it is now, with oil at $100/barrel and natural gas at $3/mcf (or one thousand cubic feet), it is much cheaper and much more efficient to produce Ethylene from natural gas liquids rather than oil-based products.

If we assume oil prices remain relatively high, and natural gas prices remain relatively low, then we can imagine that a lot of higher cost ethylene production in Europe and Asia could shut down in the future, because companies will want to buy from the cheaper US producers.

Thus, if the U.S. becomes the low-cost producer of Ethylene, and Ethylene is a primary building block of the modern world and used in many manufactured products, then the potential is to bring some manufacturing back to the U.S. In addition, manufacturers would have access to cheap abundant energy and that could lower their costs and increase their competiveness.

Is there evidence of this starting to happen?

Yes, it's happening in the Shale Gas rich areas of the country:

- Marcellus Shale
- Utica Shale
- Eagle Ford Shale

Source: U.S. Energy Information Administration based on data from various published studies. Canada and Mexico plays from ARI.
Updated: May 9, 2011

The map on Page 4 shows North American natural gas shale resources as of May 2011. The Marcellus and Utica Shale are the massive deposits located in the Northeast part of the country. The Marcellus stretches from West Virginia to New York. A large portion of the Utica Shale is actually located beneath the Marcellus, so less is known about Utica, except that it's another huge resource. The Eagle Ford is the huge shale resource located in South Texas. Other large shale plays are the Barnett in Texas and Bakken in North Dakota.

It's in these areas that companies are already planning for production. Some examples:

- A large utility company is building a natural gas processing and separation plant in West Virginia. The company obviously knows the value of the natural gas liquids in the shale gas area so they are building a new plant to separate and process those liquids.

- A major oil company plans to build a 'world scale' Ethylene plant in the Marcellus Shale region. This will be the first ethylene plant built in that area in over 50 years.

- A large chemical company is building an Ethylene production plant on the Gulf Coast to take advantage of shale gas supplies from Eagle Ford and Marcellus.

- A French steel company is building a new $650 million steel plant in Youngstown, OH. The plant will make the steel tubing that is used in drilling for natural gas. The company chose this location because of the experienced steelmaking workforce and it's in the heart of the Marcellus Shale.

So, what does all this mean??

JOBS. And lots of them. New companies will be created and existing companies will expand. We've recently read about several examples:

- An oil service company hired 11,000 workers in North America last year (and not low-end jobs either; they were looking for skilled workers, such as engineers).
- A natural gas producer hired 3,300 new workers last year and will continue to hire this year.
- Pennsylvania's employment in the natural resources and mining sector has increased 50% since 2009.
- Steubenville, Ohio boasts the Nation's second fastest drop in unemployment, due to the Shale Gas boom in the Marcellus.

Rather than working on another "federal stimulus," maybe we should try to expand the energy boom going on right now!

Another potential we see…

*Increased use of Natural Gas Engines *

The potential for natural gas engines is with trucks… medium-duty trucks to heavy-duty long-haul trucks. There are approximately 5 million heavy-duty trucks in the U.S. that consume approximately 1.6 million barrels of oil per day. So, you can imagine the potential here.

There are companies already designing engines that operate on natural gas, primarily Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG). These companies have already formed partnerships with some of the largest engine and vehicle Original Equipment Manufacturers (OEMs) around the world.

These Original Equipment Manufacturers are currently building impressive new heavy-duty trucks that operate on natural gas.

What is the major hurdle here?? Fueling infrastructure.

There are approximately 150,000 gas stations in this country, but only about 1,000 of them are equipped for natural gas. But, there have been new developments:

- A major oil & gas company recently partnered with a small natural gas technology company to co-market Liquefied Natural Gas (LNG) vehicles in North America and create standards for LNG as a new transportation fuel.
- Utility regulators in Georgia recently approved a plan to encourage private sector investment in Compressed Natural Gas (CNG) stations by offering $11.57 million in CNG fueling infrastructure for up to 10 stations that could be constructed throughout metro Atlanta.

In the last several months, natural gas prices have continued to drop, thus making natural gas an even more viable alternative to diesel fuel. And, the cost to develop and manufacture natural gas engines has fallen significantly. This combination has made it more affordable for manufacturers to use natural gas engines rather than diesel engines for heavy-duty trucks. And this is all happening <u>without</u> help from the government!!

[continued on Page 6]

Due to these favorable conditions, companies that operate heavy-duty trucks are no longer waiting for government incentives. They can save money NOW. In addition, if one company converts their trucks to natural gas and starts saving money, other companies will likely follow to remain competitive. Let's look at an example:

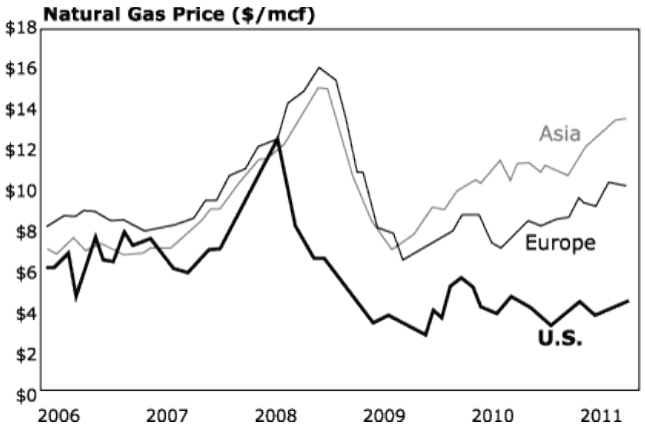
> The price difference between Liquefied Natural Gas (LNG) and diesel is currently about $2 per gallon. That may not seem like a lot, until we look at the quantities involved. A major national retailer operates nearly 7,000 trucks. Let's assume their average heavy-duty truck covers 100,000 miles annually. At five miles per gallon, that's 20,000 gallons of fuel per year. That $2 per gallon savings equals approximately $40,000 a year per truck. That's $280 million per year in fuel savings!
> *[Source: S&A Resource Report, January 2012]*

These types of economics are driving this change to natural gas engines. And companies that are building the infrastructure are ramping up their production of fueling stations across the country. *Again, without help from the government!!*

One final potential we see…

***US starts exporting Liquefied Natural Gas (LNG) ***

Why is this a possibility? Because other countries want, and need, our cheap energy supply. This opportunity becomes clear when you look at natural gas prices around the world.



Source: Motley Fool, 07/07/11

The above chart shows the divergence in natural gas prices in the U.S., Europe and Asia. As you can see, this chart shows prices as of early 2011. The divergence has only increased since, with the current price of natural gas in the U.S. dropping to approximately $3/mcf and prices in Europe increasing to approximately $13 and approximately $16 in Asia. The price of natural gas in the U.S. is so much lower because U.S. Shale Gas is the fastest growing reserve of energy in the world.

Several years ago when natural gas prices were much higher, we were actually building several Liquefied Natural Gas (LNG) import facilities around the country. Then we discovered vast resources in Shale Gas and now, those import facilities are getting approval to convert to export facilities. A couple of examples:

- An import facility located on the gulf coast on the border of Texas and Louisiana just recently got approval to convert to an export facility.

- An import facility on the coast of Maryland, which has been used for storage the past couple of years, recently got approval to convert to an LNG export facility.

Another reason for exporting Liquefied Natural Gas (LNG) …rising demand for natural gas in China, India and other emerging market economies. Even though some of these countries are rich in natural gas resources, their incredible demand outpaces their supply. Also, as I mentioned earlier, they currently don't have the drilling knowledge to tap their full reserves.

China currently has three operational import facilities, but they plan to triple the number of import facilities by 2015.

India has two operational import facilities, but they are currently expanding and adding capacity to both of them. In addition, another import facility is under construction and two more are in the planning stages.

These counties want to increase their use of natural gas and they know they will need to import Liquefied Natural Gas (LNG) in order to meet their needs.

A Different Take on Exporting Natural Gas?

We have recently read several articles questioning if we should export any of our cheap natural gas to other countries. The argument is if we begin to export natural gas to other countries that are willing to pay higher prices, U.S. natural gas prices will rise and increase costs for businesses and consumers. But, what if the demand for Liquefied Natural Gas (LNG)) creates jobs and boosts our economy?

Consider this from the Houston Chronicle:

[continued on Page 7]

"Debate is brewing over whether to keep the nation's glut of natural gas at home for cheap energy or export it at five times the price, possibly creating jobs and boosting the domestic economy. Businesses that purchase natural gas for industrial and residential use have rallied against proposals to liquefy and export the fossil fuel to Asian and European nations willing to pay much higher prices.

Nine companies have sought federal approval to export about 10 billion cubic feet of liquefied natural gas per day, which would boost prices for U.S. customers. The Sabine Pass LNG plant in Louisiana already has won approval to ship out more than 2 billion cubic feet of liquefied natural gas a day.

There's little doubt that exports will cause the price of natural gas to rise. The debate is whether the rise in gross domestic product and gas field employment might offset the negative effects of higher domestic energy prices."
[Source: Houston Chronicle, 01/13/12
Mark Perry, Carpe Diem, 1/14/12]

This is a new development because the U.S. has never had the ability to export on such a scale. It will be interesting to watch what happens.

Stay tuned....

SUMMARY

We began with what megatrends are and how they can have a profound effect on us, our society and even the world. We also mentioned a major negative trend in the U.S. has been our dependency on foreign oil. We've talked about solutions for decades, but now it's time to take action.

In the last few years, we've uncovered vast new supplies of Shale natural gas and we have basically revolutionized our energy supply.

We mentioned some of the possibilities that could come from our new abundant energy supply. The U.S. could bring some manufacturing back home and create thousands of new jobs, Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) could replace diesel fuel for heavy-duty trucks and the U.S. could become a major exporter of Liquefied Natural Gas (LNG). While these are all exciting opportunities, we don't know exactly how it will play out or what could change.

However, we could be on the verge of America's Next Great Megatrend!

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Information for this article came from these sources as well as other general reading:

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"Extreme Value", by Dan Ferris
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"US unemployed pin hopes on learning new skills, Financial Times, 10/14/2011
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"The Energy Letter", by Peter Staas, 10/18/11
"Small Stock Specialist", by Frank Curzio
Wikipedia on the Energy Crisis of 1973
"Pennsylvania Employment: Natural Resources and Mining January 2000 to August 2011", by Mark Perry, Carpe Diem, 10/13/11

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The primary author of this issue of The Benedict Report is Mark A Beaver, CFP®, an Investment Advisor Representative with **LPL Financial**, a registered investment advisory firm and member of FINRA/SIPC. Travis M James, CFP®, Philip C Benedict, CFP® and Ashley A Thompson provide technical assistance. Jean B Wilson handles the layout and editing of the newsletter.

BENEDICT
FINANCIAL ADVISORS, INC

6000 Lake Forrest Drive, Suite 550
Atlanta, GA 30328-5901
770.671.8228
www.benedictfinancial.com

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