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The Reindustrialization of America Has Begun - (Part 2)

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In the last issue of the "Consultant", we wrote about the "Reindustrialization of America" as a result of an abundance of inexpensive natural gas available to our nation, in part due to the advance of techniques to extract hydrocarbons from shale, tight sands and older reservoirs where conventional vertically drilled wells had been developed years ago. This issue continues the story of how the United States is and will be benefiting from stable, affordable, domestically produced energy.

The Roller-Coaster Ride of Natural Gas Imports/Exports

Going up the rollercoaster – U.S. prepares LNG (liquid natural gas) supply chain to import and store product.

Not long ago, the demand for natural gas in the U.S. exceeded supply. The U.S. found it strategic to plan for LNG terminals to import and then store LNG for domestic use. By 2004, LNG was expected to be an important component of natural gas supply,¹ and by 2006 there were 45 proposed LNG import projects in North America.² Unfortunately, it takes a long time to invest in and establish a LNG supply

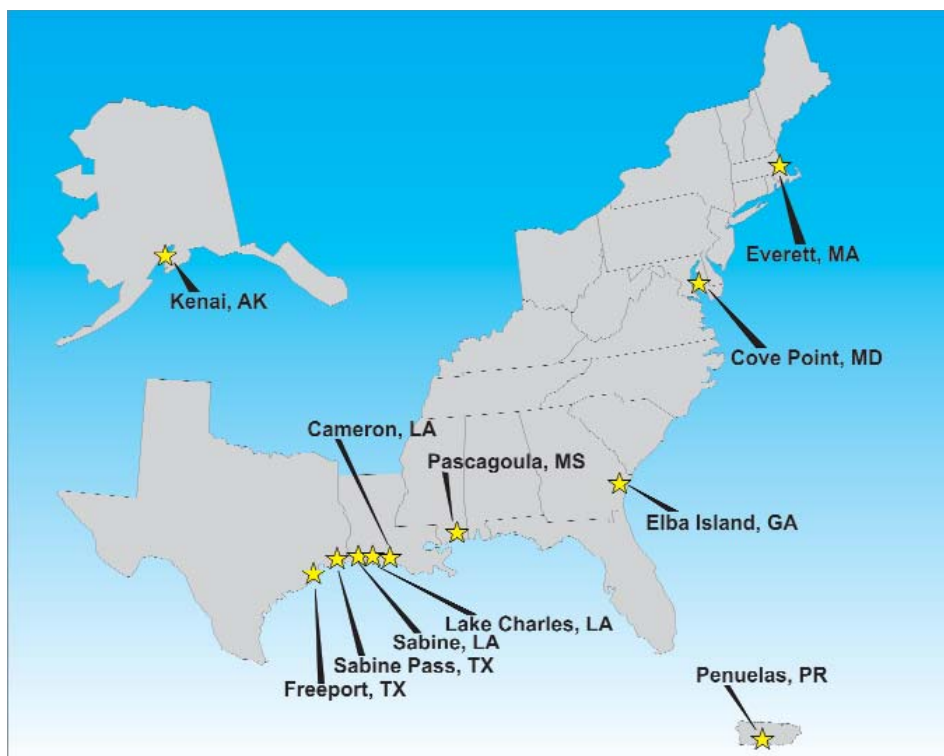
chain that includes building terminals to liquefy the gas, building ships to transport LNG to the U.S., and building LNG terminals and pipelines to gasify LNG and distribute to U.S. markets. At a total system cost, start to finish, of scores of billions of dollars, it is understandable that only a few of the 45 proposed LNG import

projects were finished.

Going down the rollercoaster – the U.S. no longer has need to import natural gas.

The primary reason the billion-dollar terminals were obsolete even before the concrete was dry was the

FERC - Federal Energy Regulatory Commission Existing FERC Jurisdictional LNG Import/Export Terminals³



¹ David E. Dismukes, Ph.D., "Unconventional Resources and Louisiana's Manufacturing Development Renaissance," Center for Energy Studies, Louisiana State University, p. 38.

² Ibid, p. 39.

³ FERC (Federal Energy Regulatory Commission, "Existing FERC Jurisdictional LNG Import/Export Terminals" (accessed February 1, 2013).


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unexpected drilling boom in new shale fields from Pennsylvania to Louisiana and Texas produced an abundance of cheap domestic natural gas.⁴ LNG imports dropped 23 percent in two years, according to FERC, and three of the 12 U.S. LNG import terminals are operating at no more than 5 percent of their capacity.⁵

Going back up the rollercoaster – Converting plants to export natural gas.

The same companies that had such high hopes for imports propose salvaging the import terminals by spending billions more to convert them into terminals to export natural gas, i.e., reverse the technology from heating the imported liquid natural gas to compressing and cooling domestic gas for export. Investors are betting that the U.S. will boost its exports and are spending capital investments to reverse the original process in the plant terminals that will enable them to market natural gas overseas.

Exporting Natural Gas – The future of energy?

While natural gas sells for about \$4 per thousand cubic feet in the U.S., it sells for \$12 to \$15 per thousand cubic feet in Europe and Asia. As an example per the

Wall Street Journal, if the price of natural gas is \$4.00 mcf, the equivalent cost for the same natural gas would be \$10.40 in Japan after an additional cost of \$6.40 to liquefy, transport and re-gasify. Because of that great price difference, foreign countries are desperate to get their hands on U.S. gas. However, the dominant way to ship natural gas overseas is to turn it into LNG. Although several companies explored shipping Compressed Natural Gas (CNG) rather than LNG, that practice has yet to be proven as economical over the LNG option.

In recent months, the prospect that the U.S. could become a significant exporter of natural gas to Europe and Asia caught fire in an election-year atmosphere colored by energy issues. Critics on Capitol Hill have said they are concerned that, despite today's rock-bottom U.S. natural gas prices, global demand for LNG over time could drive up prices for American households and for U.S. makers of steel, chemicals, plastics and energy-intensive manufactured goods.

Despite the hurdles, Cheniere Energy, Inc. is the first company to receive government approval to build an LNG export terminal in a generation. Its Sabine Pass export facility is under construction in Louisiana, and CEO Charif Souki said that he expects the facility to begin to operate in 2015.⁶

Further, in addition to FERC locations mentioned above, Freeport-McMoRan, a longtime client of NELSON, has applied for a 3.22 Bcf/d of gas as LNG from its Main Pass facility in U.S. federal waters, 16 miles offshore Louisiana.

Still, the question remains, will LNG exports be prosperous? As before, some of the costly ventures could turn out to be poor investments. Countries are developing their own gas reserves through the same fracking techniques, although not all of the countries possess the technology required to make this endeavor successful. Furthermore, without U.S. assistance, these endeavors will not produce optimum results for many years.

Demand for American gas, which would be shipped in the condensed form of LNG, could easily taper off by the time the new export terminals have progressed,

some energy specialists say. Furthermore, even the terminal operators acknowledge that probably only a few lucky companies will export gas because of the billions of dollars it can cost to build a terminal and then only after a rigorous federal regulatory permitting process. The exploratory process to find a suitable site for a new terminal alone can take a year and cost \$100 million, operators say, and financing can be secured only once long-term purchase agreements – 20 years or more – are reached with foreign buyers.

How will these new technologies affect Louisiana?

Background... A big industrial explosion occurred along the Mississippi River in the 1950s, '60s and '70s.

Since NELSON's beginning in 1945, the firm has been involved in Louisiana's industrialization of the Mississippi River. South Louisiana is in the refining and petrochemical heart of the U.S. Chemical plants were constructed along the Mississippi River and Interstate 10 corridor from Baton Rouge to New Orleans. Industrial sites were historically created from sugarcane fields or other agricultural sites. The grassroots sites were driven by the abundance of low cost natural gas and ready access to transportation and cooling and process water from the Mississippi River. There is a collaborative relationship between gas prices and Louisiana's energy-intensive manufacturing base. Louisiana's manufacturing industries rely heavily on natural gas for heat, steam, power generation and, most importantly, feedstock purposes, which are the building blocks of modern petrochemical manufacturing.

The ladder fell out from under the U.S. after OPEC's oil embargo and the ensuing energy crisis – Crude Oil Price Collapse of 1986.

The 1970s energy crisis led to the 1980s oil glut, a serious problem for Louisiana. The oil bust meant the mid-1980s, a time of great prosperity and

⁴ Clifford Krauss, "Exports of American Natural Gas May Fall Short of High Hopes," The New York Times, January 4, 2013.

⁵ Joel Kirkland, "Natural Gas: U.S. Throws Open Doors to LNG Exports with Cheniere Approval," Energy Wire, E&E Reporter, April 17, 2012.

⁶ Jim Cramer, "Exporting Nat Gas, The Future of Energy?" CNBC's Mad Money, January 3, 2013.

⁷ 175th Anniversary Feature - "1985: The Oil Bust Hits the New Orleans Economy," The Times Picayune [New Orleans, Louisiana], December 28, 2011.

optimism in the U.S., was just the opposite in Louisiana, where the economy was wounded by low energy prices.⁷ The setback came as a surprise to the state, which had enjoyed an economy that performed better than that of the nation as a whole. For example, in the 1970s, when the national economy was stagnant, Louisiana was booming, thanks to high energy prices.⁸

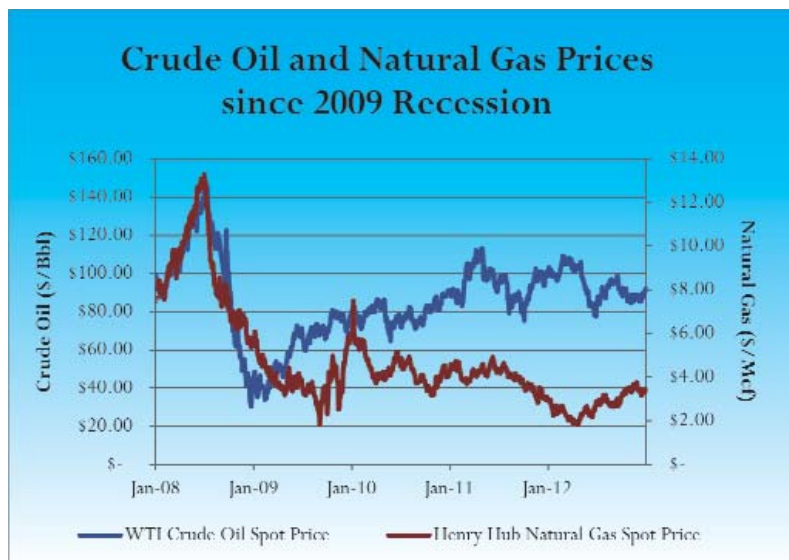
Louisiana's industry had, in fact, developed from what was a relatively low-cost and abundant energy resource and feedstock, but that changed in 1985 when a double-edged sword wounded Louisiana's economy. In less than 12 months, world crude oil prices fell by more than 60 percent, the volatility of natural gas prices soared and the end-result was bleak for Louisiana. The average price for OPEC crude oil had dropped from \$23.29 in December 1985 to \$9.85 by July 1986 and reversed the upward trend in U.S. production of the first half of the decade. Many high-cost wells, which became productive after the oil crisis of the 1970s, became unprofitable in 1986 and were shut-in. Oil company investments began shifting to foreign oil exploration and production after the 1986 price drop. No one who experienced that time in Louisiana history will ever forget it.

The Rusting of the Chemical Corridor

Even as late as five years ago, the chemical industry was in perilous times. The price of natural gas remained high. Employment in the industry had fallen from 34,000 in 1999 to 24,000 only 10 years later. Craig E. Colten, a professor at Louisiana State University, wrote a comprehensive article entitled, *The Rusting of the Chemical Corridor*, which provides insight into the dynamics of the situation.

The 2009 Recession

While the purpose of this article is not to delve into nor discuss in detail the financial crisis of 2009, it is interesting to see the effect the recession had on a primary



staple of the economy—fossil fuel. This recession originated in 2007, but the full effect was realized in the 2009 timeframe.

The graph above illustrates the interaction of the price of crude and the steady price of natural gas during this difficult time period.

This low price stability and the forecast of major finds of new natural gas resources by companies such as XTO Corporation and Chesapeake Energy began the march to bring fracking and horizontal drilling to the forefront. Major players, e.g., ExxonMobil, took the lead to buy out smaller corporations (like XTO and independents) for their gas reserves. There was a major shift to the ever-changing energy market as these financial behemoths put the assets in play in bringing these low cost fuel sources to the market.

Louisiana's petrochemical industry is now in a renaissance period

As history has proven, the success of Louisiana's manufacturing economy depends on the availability of abundant and reliable natural gas resources. Some pessimists have said that Louisiana's role as a prosperous supplier of energy was over forever; however, that proved not to be the case. Louisiana is now in a renaissance period due to low natural gas prices, new drilling technology and major discoveries that paved the path for reindustrialization in Louisiana. The Haynesville Shale basin in North Louisiana is a typical

example. Chemical and other manufacturers are opening new plants in Louisiana and expanding old ones. They are lured by the region's extensive gas pipelines and the Mississippi River's infrastructure. Louisiana Economic Development (LED) is icing the cake with property and payroll tax credits and other incentives to companies building plants.¹⁰ The end result is that Louisiana is in a renaissance period with over \$83.8 billion in new and expanded plants expected to be completed within the next three years to nine years – all of which have been documented to have been facilitated primarily by abundant natural gas supplies.¹¹

Here is a sampling of Louisiana projects:

Gas-to-Liquids Plants

Sasol – will invest between \$16 billion and \$21 billion in a major project, a gas-to-liquids and ethane cracker complex, in Westlake, Louisiana.

Royal Dutch Shell – is considering building a giant plant in Louisiana that would convert natural gas into diesel fuel and would cost more than \$10 billion.

LNG Export

Cheniere Energy – Gov. Jindal and Cheniere Energy CEO announce \$6 billion natural gas liquefaction facility at Cheniere's Sabine Pass terminal in Cameron Parish.

Sempra Energy – to invest \$6 billion for liquefaction project at Cameron LNG in Louisiana.

8 175th Anniversary Feature - "1985: The Oil Bust Hits the New Orleans Economy," The Times Picayune [New Orleans, Louisiana], December 28, 2011

9 "Petroleum Chronology of Events 1970-2006," U.S. Energy Information Administration (EIA)

10 Susan Buchanan, "Chemical Plants are Flocking to Louisiana," The Louisiana Weekly, June 11, 2012

11 David E. Dismukes, Ph.D., "Unconventional Resources and Louisiana's Manufacturing Development Renaissance," pp. 62-63, Louisiana State University Center for Energy Studies

Methanol/Ammonia

Dyno Nobel – announces feasibility study for \$800 million ammonia project at Cornerstone Chemical site in Jefferson Parish.

Cracker/Ploymer

Dow – restarts its St. Charles Olefins 2 plant after four years to accelerate investment in the U.S. Gulf Coast region. Dow plans to invest \$4 billion in the U.S. Gulf coast to increase ethylene and propylene capacity through 2017.

Sasol – will proceed with engineering and design phase for a world-scale ethane cracker with downstream derivatives at its Lake Charles site in southwest Louisiana.

Other

SNF Holding Company – announced the successful commissioning and startup of its new \$362 million grass roots production facility in Plaquemine, Louisiana.

Nucor – the nation's largest steelmaker, is building a \$3.4 billion iron-and-steel production complex in Convent, Louisiana.

How this abundance of domestic natural gas impacts other industries in the U.S.

Pipelines and the Railroads

Most crude, natural gas and natural gas liquids (NGL) have been transported by North America's massive pipeline network. With new major shale discoveries in North America where pipelines are non-existent, other means are required to provide the life blood to Gulf Coast refineries and those on the eastern seaboard. Seaway, with an existing capacity of 150,000 bbls, is being expanded to 400,000 bbls and should be completed by the end of 2013. Its twin, Seaway Twin, will be completed in 2014 with a capacity of 450,000 bbls. The controversial Keystone XL-Southern Leg is scheduled for completion by 2013. Environmental issues may keep this completion date fluid; however, that will not stop the need as the increased flow from the Bakken Shale play continues.

To address this continued capacity requirements, innovative companies such as Gulf Gateway Terminals LLC (GGT) have implemented a plan to move Bakken

crude by rail. GGT's strategy—to incorporate the innate advantages of railroads with their flexible services, to avoid the protracted pipeline permitting timeframe, and to eliminate the need for multiyear pipeline contracts—is a game changer. NELSON was retained by GGT to provide design services for a terminal at the Port of New Orleans Elaine Street Wharf. The design incorporates both land and water-side facilities to handle the transfer of 108 rail-car trains of crude to barges. The barges traverse from the Intracoastal Waterway through the Industrial Canal locks to the refineries on the Mississippi River and beyond. As of this writing, GGT has transferred over one million barrels of crude.

The Coal Industry and Electricity Utilities

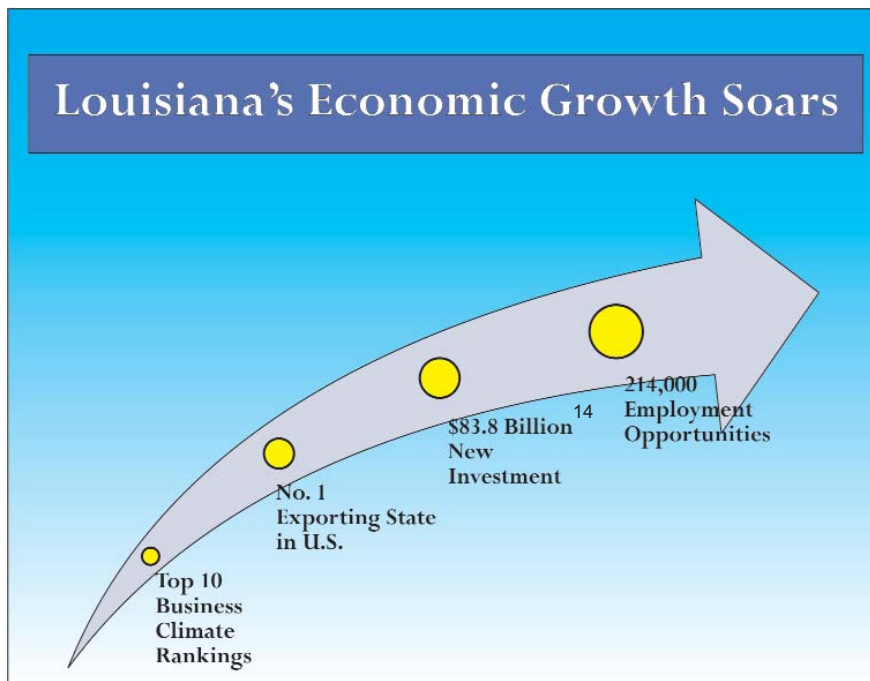
Since the early 1880s, most of the electrical power that fuels U.S. homes comes from burning coal. Some years ago, this started to change. Coal now generates just 34 percent of U.S. electricity, down from about 50 percent just four years ago. Coal carloads were down 11 percent, or about 726,000 carloads, while petroleum products rose 46 percent, or 171,000 carloads.¹²

Ask people in towns that coal built and the general consensus is that the EPA

and tough regulations are the main culprits behind what's hurting the coal industry. The regulations for reduced CO₂ emissions are costly, but another reason for the decline in coal use is that domestic natural gas is currently cheap and abundant. Four years ago, electricity generated by gas was twice as expensive as coal; today gas is less than half the price of coal.

“What that means is, literally, natural gas is going to kill more coal-fired power plants than the EPA regulation,” says Michael Zenker, a coal analyst for Barclays. In 2012, Zenker says, a perfect storm of sorts took place that sent coal down a deep spiral: an unseasonably warm winter, a significant reduction in electricity demand and, most importantly, hydraulic fracturing or fracking. A decade ago, not a single drop of American gas was produced this way; today one-third of all U.S. gas is now the product of fracking.¹³

Furthermore, Georgia Power Company's newest generating plant near Atlanta has two gas turbines and one steam turbine generating about 840 megawatts. At one time, it would have taken 100-car trains of coal every two days delivering 5,000 tons of coal to generate that much power. The turbine that was run by coal is gone and was replaced with one utilizing natural gas.



¹² Spener Jakob, "Just What is working on the Railroad," *The Wall Street Journal*, January 21, 2013

¹³ Guy Raz and Lauren Silverman, "Miners Weather the Slow Burn of Coal's Demise," *NPR*, July 14, 2012

¹⁴ Loren C. Scott, Professor Emeritus in Economics and James A. Richardson, John Rhea Alumni Professor of Economics Louisiana State University, "Louisiana Economic Outlook, 32nd Annual Edition 2014-2015". In reference page 9-10

This new installation produces power at lower cost than coal and eliminates issues surrounding coal and EPA

The coal industry, however, is not dead. The coal industry has sought other markets outside the U.S. This creates barge traffic from places like West Virginia and Kentucky to barge coal down the Mississippi River and then ship it overseas. The reindustrialization of the Mississippi River is now adding more coal terminals. Further, the West is looking at mining expansive coal beds, shipping by rail across 1,000 miles to Seattle and exporting it to China. As long as there is market value for these forms of energy in the world, there will be people willing to harness and sell them. While the coal industry is not dead, for the interim, natural gas has altered its role in the U.S.

Coal terminals on the lower Mississippi River have announced, and in many instances brought on-line, expansions to existing facilities that have had a presence for decades. NELSON has been involved in the design of three coal terminals on the lower Mississippi. One was a study for a deep draft bulk ship with a berth off the mouth of the Mississippi river to facilitate coal transshipments. NELSON is currently in discussion with major entities concerning other opportunities for coal storage and handling.

U.S. Steel Industry Set to Grow on the Back of the Shale Boom

The U.S. steel industry also benefits from the huge boom in natural gas production from fracking. At one time, the steel industry was a powerhouse in the American economy, but it has struggled since the 2008 financial crisis led to a collapse in commodity prices. Things are looking up for the steel industry, and it is also sharing the benefits of America's reindustrialization.

The Austrian steelmaker, Voestalpine AG, has announced that it may develop a \$661 million factory in the U.S. to benefit from cheap natural gas; and Nucor Corp., the largest U.S. steelmaker, is building a plant in Louisiana.

These are just two of several projects that are under consideration or construc-

tion that would use cheap natural gas instead of coal to purify the iron ore.¹⁵

Nucor has located the first phase of a \$3.4 billion steel processing plant in St. James Parish. Mississippi River access, which provides reliable and inexpensive transportation of raw material and export of finished product, was a major reason for its location. The availability of inexpensive natural gas surely had an impact on Nucor's decision to locate in Louisiana, but at the time of the decision, it probably did not have the impact that was recently announced.¹⁶ As a sign of innovative commercial agreements that developed as a result of predictable shale gas, Nucor in partnership with Encana has entered into a contract to share in project milestones for the extent of their 10-year contract.

What could go wrong?

One thing that is clear is that the environmental and political acceptability of the technologies that produce amounts of oil and gas sufficient to create an export market is far from settled. There are those who see fracking and horizontal drilling as a major direct or indirect threat to the environment. Fracking's high-volume use of water and the effects of lower water tables in affected communities is a major concern. Further, there is always inherent risk associated with any endeavor, and disaster can transpire if proper protocols are not followed and human errors are not considered.

Conclusion

The Reindustrialization of the United States and Louisiana's role in that reindustrialization is in full throttle with fracking and horizontal drilling of shale rock formations creating the path to U.S. energy self-sufficiency. For the first time in history, in 1994 the U.S. imported more petroleum than it produced. During the 50+ years preceding this event, the world experienced tremendous and unpredictable swings in the price of oil and its availability that no one wants to experience again. Fracking and its related technologies hold the key to potential stable pricing and adequate resources. The U.S.

is now on a path toward energy self-sufficiency and independence.

Access to shale resources for petroleum products, including oil and natural gas, may be common in other parts of the world, but effective fracking technology is not. The U.S. has the longest history with hydraulic fracturing, and its prior experience makes for a promising future. A working knowledge of the "art" of fracking provides the U.S. a competitive advantage in the world market. Other countries may have the shale resources available to them; however, political controversy, geographical challenges and the lack of this sophisticated technology are barriers to market entry.

The success of Louisiana's manufacturing economy depends on the availability of abundant and reliable natural gas resources, and as reported here, Louisiana is experiencing a renaissance in business due to low natural gas prices, the new drilling technology available, and the lure of the region's extensive gas pipelines and infrastructure. Additionally, property and payroll tax credits combined with other valuable incentives are also drawing companies to the state to build plants. Once again, this boom in new and expanding plants will return the corridor between Baton Rouge and New Orleans to an industrial powerhouse.

Current massive investments that have been expended and are planned will provide the direction for fracking and the much sought after energy independence. A subject matter of this importance will always have paradigm shifts and unpredictable outcomes. While there are unknowns, one issue is certain... when the U.S. populace perceives a threat to its independence, it will rise to the occasion and allow industry to advance its technology to maintain its independent lifestyle. That strong independence will help advance the shale plays that may be the saving grace to restore the U.S. to energy independence.

NOTE: *George P. Mitchell (May 21, 1919 - July 26, 2013), founder of Mitchell Energy & Development corporation, is credited with pioneering the economic extraction of shale gas. Mr. Mitchell passed away on July 26, 2013.*

¹⁵ Charles Kennedy, "U.S. Steel Industry Set to Grow on the Back of the Shale Boom," Oil Price.com, January 1, 2013

¹⁶ Chad Caldere, "Nucor Locks in Natural Gas Deal," *The Advocate* [Baton Rouge, Louisiana] November 14, 2012

Eric N. Smith, Clinical Professor and Associate Director, Entergy-Tulane Energy Institute

John J. Driscoll, Managing Director Corporate Planning Resources, LLC

2013 Recognition Dinner and 2013 5/10/15 Year Luncheon

On Wednesday, October 9th, our annual Recognition Dinner was held at Ralph's On The Park, honoring employees who have been with the firm for twenty or more consecutive years of service. On October 8th and 23rd, our annual 5/10/15 luncheons were held honoring employees who have been with the firm five to fifteen years. Department Managers and members of our Executive Committee gathered to celebrate with the honorees.

The ongoing success of Waldemar S. Nelson and Company is the result of the steadfast loyalty of these honorees, and we congratulate them and thank them for their ongoing efforts to assist in satisfying the needs of our clients.



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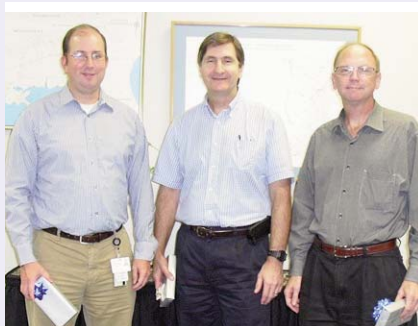
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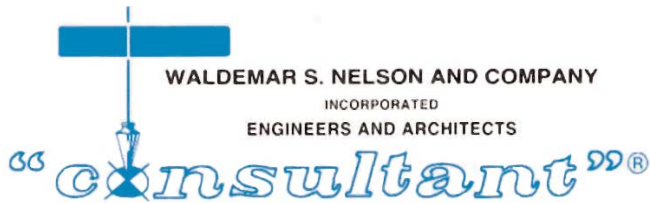
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Houston office employees, Robert Griffin, Rene Boan, Briana Houghton (daughter of Kevin), Kevin Houghton and Bill Cobb, represented NELSON in the Fifth Annual Warrior Sporting Clays Tournament benefiting Team Red, White & Blue®. The local Houston event supports veteran non-profit programs/organizations. This event is in honor of veteran service men and women, and provides a focus on what veterans can achieve when given assistance from their fellow Americans.