
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

Age Of Private Equity Has Benefitted From Shale Revolution

One of those forces is private equity funding

In our article in the last issue of the *Musings* entitled “Shale Alters Energy Market, Business Strategy and Investing,” we said the purpose of the article was to set the stage for more detailed examinations of the various forces being impacted by and impacting the American shale revolution. One of those forces is private equity funding. In some cases, the money is flowing from established private equity funds while in others it is coming from new investors. In its purest form, private equity is risk capital invested in commercial businesses designed to help the founding management take the company to its next level of logical development, which usually involves either expanding the geographic reach of the business via either de novo investment in new locations, or geographic consolidation of similar businesses, or growing the company through product line extensions via acquisitions.

Private equity funds market their capital contribution as patient, high risk equity that comes with the support of experienced and sophisticated financial, management and business strategy experts

Private equity funds market their capital contribution as patient, high risk equity that comes with the support of experienced and sophisticated financial, management and business strategy experts. These experts are prepared to partner with the company’s original owners, or its second-line management that may desire to take-up managing the company as an alternative to the founders’ traditional exit strategy of selling the business. Without debating the merits of private equity, it has been an integral part of capitalism for centuries. The history of private equity is often associated with the bankrolling of companies by investment banks that eventually became prominent players in the economic development of countries and industries. Private equity investing blossomed with the great European financial families such as the Rothschilds and the Warburgs who built successful financial empires and invested in industrial enterprises they perceived as having attractive long-term futures.

America's dramatic industrial growth period was driven by technological inventions in power, machinery and communications and the development of the modern corporation in businesses such as steel, railroads and automobiles

As these great European financial houses expanded into the United States either directly or through associations with North American financial firms, often staffed with people they had trained, the great industrial growth period of the late 1800s and early 1900s was stimulated. America's dramatic industrial growth period was driven by technological inventions in power, machinery and communications and the development of the modern corporation in businesses such as steel, railroads and automobiles. America's industrialization also benefitted from the nation's abundance of natural resources and its isolation from the political turmoil of Europe. During that industrial age, private equity played a key role in building large corporations, which developed national and eventually global reaches. Private equity, in the form of what became known as venture capital, spurred the creation of new technologies such as the semiconductor and software.

Entrepreneurs were tested both operationally and financially, and often were found wanting

The energy business evolved somewhat differently as it was driven by entrepreneurs. In the upstream portion of the business, these entrepreneurs were known as "wildcatters" and comprised of a cadre of knowledgeable players who understood the basics of geology and where oil and gas accumulations might be found. They either had the capability to drill wells to test their theories or they turned to the mechanically-oriented entrepreneurs behind oilfield service businesses. For decades, as oil and gas carved out a role in the nation's energy supply, the industry experienced booms and busts often tied to the pace of new discoveries that nearly instantly altered the supply/demand balance and in turn changed commodity prices. As a result, these entrepreneurs were tested both operationally and financially, and often were found wanting. Energy fortunes were made and lost, and not just over card games in remote, but notable, oil patch towns.

Eventually, liquid hydrocarbon energy assumed a leadership role in our national energy mix; exemplified by oil's role in enabling the Allies to win World War II

The private equity business ebbed and flowed with the industry and financial cycles, while petroleum became the new energy source that began to displace coal as the primary source of power for the growing U.S. economy due to its delivery of more energy per unit of output along with its increased flexibility as a source of power. Refined crude oil enabled the American automobile industry to grow and natural gas, often a waste product of oil production, became a feedstock for new, amazing materials such as nylon and plastics – the word of advice whispered to Dustin Hoffman in *The Graduate*. In the middle decades of the 1900s, natural gas was marketed as a cheap and cleaner way to heat one's home and cook a family's food. Eventually, liquid hydrocarbon energy assumed a leadership role in our national energy mix; exemplified by oil's role in enabling the Allies to win World War II.

The early 1970s marked a significant shift in the course of this nation's economy and its energy business. Domestic crude oil production peaked in 1971 and began a slow but steady decline, forcing the petroleum industry to shift its emphasis on finding and

America's support for Israel in its 1973 war with Egypt, spurred the Arab members of OPEC to collectively act to restrict oil exports to certain European countries and the United States

developing new supplies to overseas locations. Natural gas entered a dark period of evolution as a result of previously ill-conceived price regulation that drove out the risk capital the industry so desperately needed in order to develop additional gas supplies. In the early 1970s, the Nixon Administration's experiment with wage and price controls created distortions in the economy and when coupled with an ill-conceived move by the Seven Sisters of the oil industry to reduce the benchmark price of Middle Eastern crude oil emboldened the members of the Organization of Petroleum Exporting Countries (OPEC) to fight back. America's support for Israel in its 1973 war with Egypt, spurred the Arab members of OPEC to collectively act to restrict oil exports to certain European countries and the United States. This oil embargo followed OPEC's move to quadruple the wellhead price of oil to offset the impact inflation was having on the value of the U.S. dollar, the currency in which oil was priced. The shock to the global economy from these actions created a deep recession in 1979-1980, which required a decade of recovery in order to overcome the drop in oil use in the United States.

The world was forced to shift its focus from purchasing creature comforts to buying energy-efficient consumer and capital goods

The oil price shock of 1973 ushered in an extended period of poor financial performance for companies and their share prices as reflected by the decade's lack of increase in the Dow Jones and Standard & Poor's 500 indices. Inflation and high interest rates further exacerbated the weak results from financial markets. The jump in energy costs hit consumer budgets contributing to the extended period of weak economic activity and energy consumption. The world was forced to shift its focus from purchasing creature comforts to buying energy-efficient consumer and capital goods. Higher crude oil and natural gas prices during the 1970s enticed large capital flows into the energy business. Those flows were assisted by creative, tax-driven investment vehicles. The global petroleum industry, taking its cue from higher prices and the perception of hydrocarbon shortages, commenced exploring worldwide and building the equipment necessary to facilitate this global effort.

There are 250 energy management teams backed by private equity firms

Out of the forces shaping this era emerged energy private equity funds designed to capitalize on the investment opportunities on the horizon. First Reserve was the first dedicated fund and was created by two investment pros that had been doing deals for an old-line broker Oppenheimer & Co. Their fund was eventually followed by a host of other private equity firms with either a dedicated or concentrated energy focus. Today, according to a recent *Oil and Gas Investor* magazine report, 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. According to Scott Richardson, cofounder and principal of RBC RichardsonBarr, there are 250 energy management teams backed by private equity firms,

The private equity business has close to \$700 billion in dry powder to back investment opportunities

Fund-raising in 2013's third quarter was greater than in the same period a year ago

a universe we expect will continue to grow. At the present time there is no count of the number of energy management teams focused exclusively on international ventures that are backed by private equity funds. The private equity funds cited above have at any point in time an estimated \$60 billion of capital available for new energy investments.

The picture for energy private equity funds is mirrored by that of the overall private equity industry. In a recent webinar on the 2014 outlook for oil and gas merger and acquisition activity, it was pointed out that there was an overhang of approximately \$330 billion in all private equity funds that was pointed to as a potential catalyst for M&A activity next year. That overhang would include the estimated \$60 billion of money targeting energy investments. The equity pool waiting to be invested can be levered by an equal amount of bank debt, suggesting the private equity business has close to \$700 billion in dry powder to back investment opportunities.

While we don't have it available, the webinar showed a slide of the overhang of private equity capital at year end from 2007 to 2012. The overhang grew between 2007 and 2008, but since then has steadily declined from roughly \$380 billion to \$330 billion. A report by *PitchBook*, a company that tracks private equity and venture capital investment activity, shows that fund-raising in 2013's third quarter was greater than in the same period a year ago. While the chart in Exhibit 1 shows 2013 trailing the fund raising totals for 2012, we suspect that this year will surpass last year and become the best fund-raising year since 2008.

Exhibit 1. Private Equity Industry Growing Again



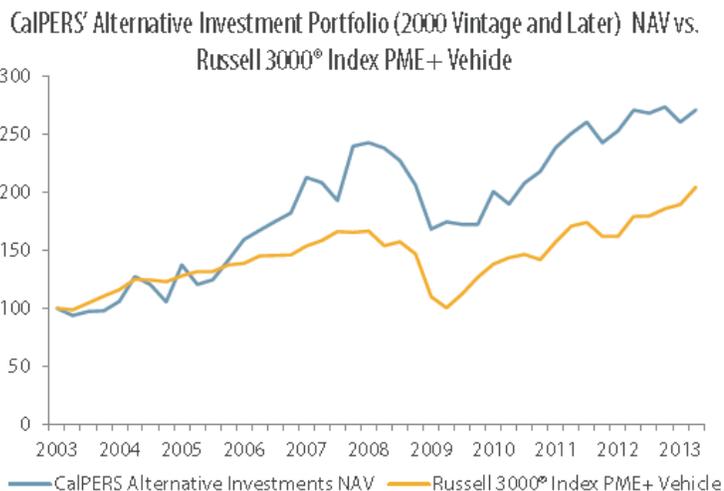
Source: *PitchBook*

What is driving private equity funding are studies showing that as an investment class, the growth in net asset value of these investments has increased at a faster rate than the returns from investing in the broad stock market. A chart prepared by *PitchBook* shows this outcome for the California Pension Fund (CalPERS). They used their benchmarking tools to aggregate all of CalPERS's contributions to and distributions from alternative investment funds invested in 2000 or later. The purpose of the exercise was to answer the

This performance data has given pension and endowment funds a mandate for increasing the percentage of their funds allocated to private equity and venture capital funds

question: “Would CalPERS have been wise to stop making new investments in PE and VC prior to 2000?” Based on the results in Exhibit 2, clearly CalPERS was smart to continue investing in PE and VC funds, which outperformed the stock market as measured by the performance of the Russell 3000 Index. This performance data has given pension and endowment funds a mandate for increasing the percentage of their funds allocated to private equity and venture capital funds. Until this relative outperformance is reversed, these funds will continue dedicating more money to alternative investments.

Exhibit 2. Private Equity Outperforms Stocks



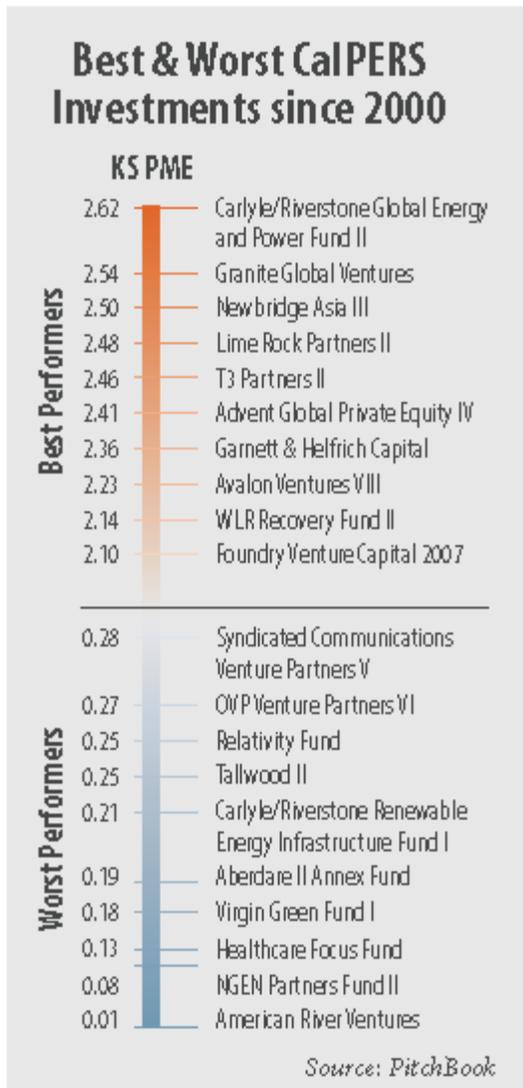
Source: PitchBook

Source: *PitchBook*

Included in the top ten are an energy and power fund from Riverstone Holdings and another fund from Lime Rock, both of which are private equity firms that target energy, broadly-defined

A table accompanying the *PitchBook* analysis of CalPERS' alternative investment performance listed the ten best and worst performing investments since 2000. Included in the top ten are an energy and power fund from Riverstone Holdings and another fund from Lime Rock, both of which are private equity firms that target energy, broadly-defined. We are not familiar with the remaining eight funds, but suspect none of them are energy only or energy-focused. Possibly more telling about the recent performance of alternative investments was the inclusion of two renewable energy funds on the list of the ten worst investments. Again, we are not familiar with the other eight funds, but from their names we suspect they are not involved in energy, either traditional or green.

Exhibit 3. Best And Worst PE Funds



Source: PitchBook

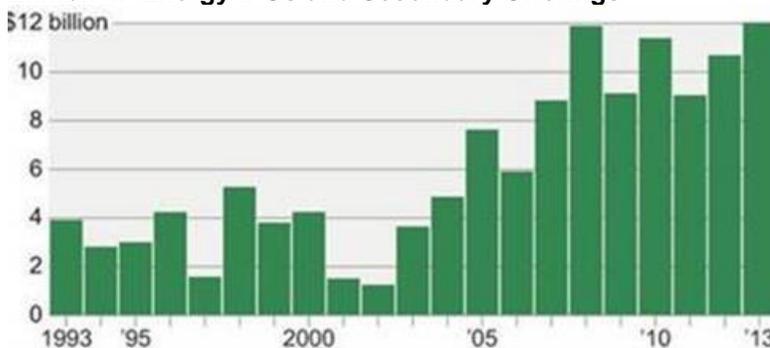
Another interesting development in energy capital-raising by private equity funds is the increased use of public stock markets to tap new sources of capital – in particular individual investors

In our previous *Musings* article, we highlighted a chart from *The Wall Street Journal* based on data from *Dialogic* showing the amount of money raised in energy initial public offerings and secondary deals since 1993. The chart shows that through mid-October, \$12 billion in energy deals had been raised putting the industry on track for a record capital-raising year. Since then there have been some additional floatations of private equity-backed energy firms. Another interesting development in energy capital-raising by private equity funds is the increased use of public stock markets to tap new sources of capital – in particular individual investors. This technique has been used for a handful of years by general private equity firms, but now energy private equity firms are

Students of the stock market are always fascinated by the public's entrance into investment fads at the top

creating dedicated funds staffed with experienced energy executives, either retired or lured to the venture, and seeded with a substantial slug of the private equity capital from institutional investors along with investment capital from the fund's principles and then floated on the stock market. One of the recent high-profile funds utilizing this strategy was Riverstone Energy created by Riverstone Holdings. The fund's board of directors includes Lord Browne, former CEO of BP Ltd. (BP-NYSE), Robert Wilson, former chairman of BG Group (BG.L) and Jim Hackett, former chairman and CEO of Anadarko Petroleum (APC-NYSE). Riverstone Holdings and the management, including Lord Browne, are putting in £50 million (\$81.7 million) of the initial funding along with £500 million (\$817.2 million) from investors including the Alaskan Permanent Fund Corporation, Hunt Oil Company, KFI, the private equity vehicle run by Louis Bacon, founder of Moore Capital Management, and The McNair Group, owned by Bob McNair, owner of the Houston Texans, among others. The fund raised £760 million (\$1,242.1 million) in a public offering in London in late October, giving it a total capital base of £1,310 million (\$2,141.1 million). Since private equity firms are compensated by fees from the money they manage, the use of newly floated energy funds is a creative way to boost their funds under management by tapping the public's desire to invest alongside sophisticated investors, i.e., private equity firms. Students of the stock market are always fascinated by the public's entrance into investment fads at the top.

Exhibit 4. Energy IPOs and Secondary Offerings



Source: *Dialogic, Wall Street Journal*

This flattening in spending reflects a spending shift, but it also highlights the new dynamic of pressure on producers to drive down oilfield costs to boost profitability

The shift in the shale revolution from a land acquisition and formation delineation phase to one of resource exploitation means the flow of capital needed becomes more clearly defined at the same time volatility of operations and production become muted, producing investment characteristics that appeal to private equity funds. These trends were emphasized during the webinar by a chart the speaker referenced showing a flattening in the growth in domestic capital spending by exploration and production companies. The comment was made that this flattening in spending reflects a spending shift, but it also highlights the new dynamic of pressure on producers to drive down oilfield costs to boost profitability. This shift

We continue to wonder whether private equity funds will become like the doctors and dentists who funded the late 1970s energy boom

in activity, coupled with the lack of improvement in financial results, may signal future market shifts that analysts have yet to perceive. We continue to wonder whether private equity funds will become like the doctors and dentists who funded the late 1970s energy boom only to be wiped out with the collapse in oil prices in the first half of the 1980s. What is happening with private equity investing in the energy sector is merely another manifestation of how the shale revolution has changed conventional thinking about energy investing.

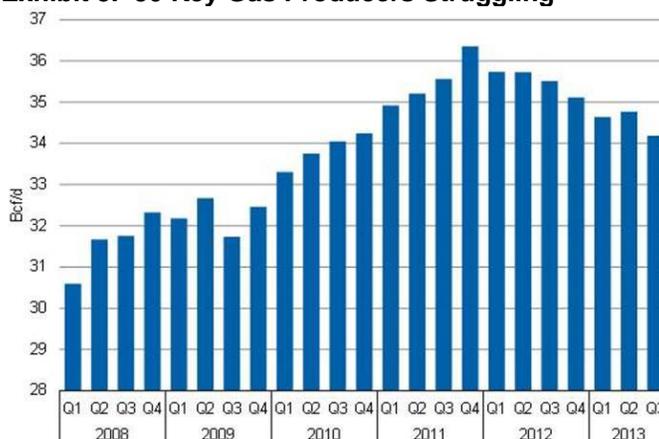
North America Gas Output Trends Show Mixed Performance

Since the end of 2011, gas production by this group of key producers has steadily declined

We were recently forwarded a research note from AltaCorp Capital's research division that contained an interesting chart of North American gas production by 30 key producers. The data in the chart was drawn from *Bloomberg*. Unfortunately, there was only the chart and a few bullet points of analysis. The key conclusion of the chart was that natural gas output for these 30 key producers rose from the first quarter of 2008 to a peak in the fourth quarter of 2011, although there was quarterly volatility in volumes produced during 2008 and 2009. Since the end of 2011, gas production by this group of key producers has steadily declined.

It would have been nice to know exactly who the 30 key producers were other than the three who were cited for experiencing output declines – ExxonMobil (XOM-NYSE), Chesapeake (CHK-NYSE) and EnCana (ECA-NYSE). One of the bullet points was that some of the 30 producers had demonstrated output gains throughout the period, and they listed Southwestern Energy (SWN-NYSE), Cabot Oil & Gas (COG-NYSE), EQT Corp. (EQT-NYSE) and Range Resources (RRC-NYSE). The point the author was making was that the nature of the shale revolution is having a disproportionate impact on producers because not all shale plays have developed alike.

Exhibit 5. 30 Key Gas Producers Struggling



Source: *Bloomberg*, AltaCorp Capital Research

How much the production declines of producers such as Chesapeake and EnCana might be related to properties they have disposed of in recent years?

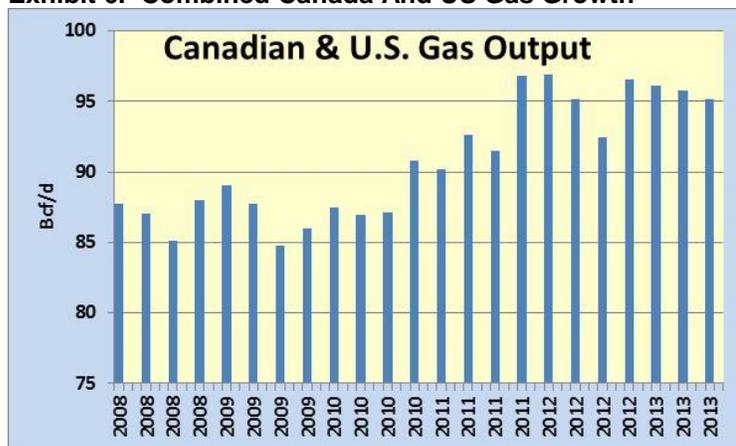
Therefore, some producers who selected the “right” portions of a shale formation have been more successful than those who unfortunately selected the “wrong” ones.

A key part of the analysis that we can’t determine from what was presented is how much the production declines for producers such as Chesapeake and EnCana might be related to properties they have disposed of in recent years. Unfortunately, it is virtually impossible to reassemble the producing properties of each producer to more realistically compare them on an apples-to-apples basis.

The 30 key producers’ share of that production shrank from 55% in 2008 to 40% in 2013

Another issue we had with the data in the bullet points was the gas production numbers. The author stated that combined Canadian and U.S. output grew from 70 billion cubic feet per day (Bcf/d) to 83 Bcf/d while the 30 key producers’ share of that production shrank from 55% in 2008 to 40% in 2013. The author pointed out that U.S. production grew from 55 Bcf/d to 70 Bcf/d while Canadian output decreased from 15 Bcf/d to 13 Bcf/d. We are not sure what numbers the author was using, but when we collected the historical data from Canada’s National Energy Board (NEB) and the U.S. gas production data as reported by the Energy Information Administration’s (EIA) Form 914 monthly report, we arrive at different totals. We took the monthly numbers and then averaged three months output for each quarter. Our calculations showed that Canadian output slid from a little over 16 Bcf/d to slightly under 13 Bcf/d. In the case of U.S. output, the quarterly average rose from about 71.5 Bcf/d to 82 Bcf/d over the nearly six-year period. Therefore, North American output climbed from 87.5 Bcf/d to 95 Bcf/d.

Exhibit 6. Combined Canada And US Gas Growth



Source: NEB, EIA, PPHB

While some might suggest that we are quibbling with the data since we don’t really disagree with the basic conclusions of the analysis, we wondered whether a slightly more rigorous analysis might shed light on other conclusions of how the shale revolution is changing

When the large foreign national oil companies came in as joint venture partners, how was the output from their ventures with companies counted?

producer strategies. That research might help confirm whether the overall growth in combined Canadian and U.S. gas production has really come from smaller companies and private operators. How are/were companies such as Statoil (STO-NYSE), BHP Billiton (BHP-NYSE) and the Chinese producers accounted for? We don't consider them smaller companies. Likewise, when the large foreign national oil companies came in as joint venture partners, how was the output from their ventures with companies counted? Another interesting point that might have come from a closer examination of the relative success or failure of producers would be to examine their financial performance over the period, especially in relation to the vast amounts of capital they committed. The chart and data comments were interesting, and not surprising. However, it also raises many questions that will have bearing on how the shale revolution develops from here.

The Economist's World In 2014 Report's Interesting Points

Compared to five years ago, the high risk universe contains 19 more countries, a development that bears watching

The Economist magazine recently issued its outlook report for 2014. The editors use this edition to look at many data points and economic and social trends in order to speculate on how they may play out in the geopolitical world. We look forward to this annual issue because there are always interesting data and trends the editors uncover that we need to consider in our outlook. We found several such items in this year's report. One came from an article headlined: "Ripe for rebellion?" The magazine's sister research organization, *Economist Intelligence Unit*, produced a table ranking 150 countries by their risk of social unrest in 2014. According to the ratings, 65 countries, some 43% of the 150 total countries rated, are at a high or very high risk of social unrest next year. They rated 54 countries where the risk of instability is medium and the remaining 31 countries have a low or very low risk. Compared to five years ago, the high risk universe contains 19 more countries, a development that bears watching.

There are several geographic locations that contain most of the high-risk countries

As one would expect, there are several geographic locations that contain most of the high-risk countries, and one should not be surprised that they are in the Middle East and North Africa (MENA), southern Europe, the Balkans and the former Soviet countries of the Commonwealth of Independent States (CIS). There were 12 of 18 MENA states, six of seven Balkan countries, eight of the 12 CIS countries and five out of six southern European countries. The *EIU* also pointed out that 40% of Eastern European countries are in the high-risk group as well as many of the countries in the sub-Saharan Africa region.

While the *EIU* places some Latin American countries in the high-risk category, it also included China, where they see the possibility of mass protests from the government's policies. While we were not surprised to see Venezuela in the very high risk category, we were a little surprised to see Brazil, Mexico Panama and South Africa in the

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high risk group. The biggest surprise was Panama, a country touted by many retirement advisors as a great location for Americans to retire to due to its attractive living cost, government incentives to attract Americans with plans that allow the importation of new cars tax free every few years along with free airline tickets home and high-quality health care. We assume Panama has a vibrant economy due to its choice for regional headquarters by corporations doing business in South and Central America. The upcoming expansion of the Panama Canal will also help its economy. There was a full-page ad in the magazine by the Panamanian government headlined: "A New Dawn For Panama: Leading The Way In Latin America, Panama's Future Is Bright." If unrest develops, what does it mean for global trade, especially in the Southern Hemisphere?

The Economist magazine discusses the increased educational achievements of a growing portion of Mexico's youth

In the case of Mexico, we understand the years-long battle between the government and the drug lords, which has resulted in thousands of deaths and the creation of a war-zone, but the Mexican industrial sector, especially in its northern region, appears to be booming. In fact, another article in *The Economist* magazine discusses the increased educational achievements of a growing portion of Mexico's youth. In fact, the article highlights the new "Engineered in Mexico" label, which is surpassing the "Made in Mexico" designation. This is an important development for Mexico's automobile industry, and its population.

The prospect of Mexico revising its decades-long policy of absolute control over the development of its crude oil and natural gas resources is exhilarating – especially for energy and service companies

In the United States, natural gas demand growth to fuel northern Mexico's industrial boom is driving a rise in export volumes, something not expected to slow down in the next few years. In fact, new export pipelines have been approved to carry additional South Texas Eagle Ford gas production to Mexico. More recently, the president of Mexico has proposed new legislation to restructure the nation's petroleum industry. The prospect of Mexico revising its decades-long policy of absolute control over the development of its crude oil and natural gas resources is exhilarating – especially for energy and service companies. The proposal's potential suggests an impending rush of outside capital into the country to help develop the known and prospective petroleum resources is likely to reverse the nearly decade-long decline in the nation's oil production. This could be very good news for the Mexican government that depends on the earnings of its national oil company, Pemex, for a substantial amount of its tax revenue. Additionally, the country would benefit from the new jobs that would be created by the revival of oil and gas exploration and development.

South Africa has been at risk of social unrest for decades as the country transitioned from apartheid to one of racial equality. Since income inequality is wide and the country depends on industries that require dangerous work by minority workers who are generally undercompensated, the country could be considered a powder keg waiting to explode. What impact the passing of former leader Nelson Mandela might have on the country's future remains to be

That accident coincided with the government's decision about reducing fuel subsidies, but which suggests that the national oil company may be facing greater structural problems with its deteriorating financial situation that could impede the development of its offshore resources

The implication of this achievement is that the region will no longer be the locus of cheap labor, which has driven the Southeast Asian economic miracle

seen. But possibly a big surprise for many is the selection of Brazil as a high-risk country. This is the country with huge offshore oil and gas reserves that are the focus of significant petroleum industry investment and is an offshore and deepwater technology laboratory. The country is about to become the focal point of sports news in 2014 as it hosts the FIFA World Cup competition for football, the globe's most popular sport, known as soccer here. A recent accident at the stadium construction site may be a precursor of greater problems for the country. That accident coincided with the government's decision to reduce fuel subsidies, suggesting that the national oil company may be facing greater structural problems with its deteriorating financial situation that could impede the development of its offshore resources. All of these issues may be the tip of a potentially explosive social condition that many observers have ignored, and which could create serious disruptions for the global offshore oil and gas industry. The recent bankruptcy of OGX Petróleo e Gás, a private conglomerate energy company active offshore in the oil and gas basin and other industrial enterprises, could be another signal about the frailty of the Brazilian economy. Only time will tell.

Another issue *The Economist* dealt with was the dramatic demographic change underway in Asia. While many are familiar with the population challenges of China due to its one-child policy that results in a shrinking of the nation's work force beginning in a few years, few truly appreciate the impact of the dramatic decline in the fertility rate for females throughout the region. Projections are that Asia's total fertility rate will fall to 2.1, meaning it reaches the point of population equilibrium, or the number of children a woman can expect to bear during her lifetime that matches the rate needed to maintain a static population. In 1960, the Asian fertility rate was 5.8. There is a disagreement between the UN and Chinese demographers about when this replacement rate will be reached, with the UN suggesting it will occur in 2015-2020, while the Chinese say the replacement rate will be reached in 2014. The implication of this achievement is that the region will no longer be the locus of cheap labor, which has driven the Southeast Asian economic miracle. It also means that many of the countries in the region will begin to age faster with the associated economic and social costs. For China, the huge imbalance between men and women of procreation age could produce social unrest as men competitively seek wives or other outlets for their permanent single status. This is an issue we have written about, but each article becomes more demonstrative about the government's concern over the risk of social unrest from this development.

We were also intrigued by the one chart associated with the North America section of "Countries: The world in figures" that contains outlooks and economic data for the countries of each region of the world. In this case, the chart was headlined: "North America: all hail shale" but it contained only U.S. crude oil production and import

Next year will mark 25 years since the fall of the Berlin Wall with its geopolitical ramifications throughout Europe and the Communist world, and the establishment of America as the lone super power in the world

figures since 1994 with projections from the Energy Information Administration for 2014. The chart shows the two lines crossing as domestic oil output climbs and imports fall. If that doesn't capture the driving economic force in the region of the shale revolution, nothing else does.

Lastly, we were surprised by the number of historic anniversaries that will be celebrated in 2014. For people of a certain age, next year will mark the 50th anniversary of the Fab Four's first Number 1 hit in America, "I want to hold your hand." One hundred years ago in June, Archduke Ferdinand of Austria was assassinated, an event that eventually led to World War I. It will also be the centennial celebration of the opening of the Panama Canal, an international trade game-changing event. In 2014, Americans will celebrate 200 years of singing the words of the national anthem, "The Star-Spangled Banner." And maybe one of the more momentous events in modern history - next year will mark 25 years since the fall of the Berlin Wall with its geopolitical ramifications throughout Europe and the Communist world, and the establishment of America as the lone super power in the world. As we said, the [World In 2014](#) offers many interesting and intriguing events and trends, many of which could have significant implications for the world's economy, its energy consumption and its supply trends.

The Politics Surrounding Wind Energy Are Blowing Hot

Wind energy proponents are mounting an intense lobbying effort to secure the PTC's extension

It is early December and Congress is wrestling with developing a budget agreement, if only for a short term extension, in order to avoid another federal government shutdown. Somewhat lost in this effort is the prospect of a year-end termination of the wind energy tax credit known as the Production Tax Credit (PTC). Wind energy proponents are mounting an intense lobbying effort to secure the PTC's extension, but it ultimately could become a victim of the frantic budget and associated tax negotiations underway.

The benefit of the revival of the PTC for wind farm developers was further helped by the interpretation of IRS rules on what constituted a wind project being "under construction" at year-end for tax credit eligibility purposes

You may remember that the PTC was due to expire at the end of 2012, but won a one-year extension as part of last December's "fiscal cliff" deal. The benefit of the revival of the PTC for wind farm developers was further helped by the interpretation of Internal Revenue Service (IRS) rules on what constituted a wind project being "under construction" at year-end for tax credit eligibility purposes. The IRS said last May that a developer was entitled to claim the PTC if his project had either started "physical work of a significant nature" or if it had incurred at least 5% of the project's estimated total cost by December 31st. This definition has contributed to a surge in wind construction activity during the second half of 2013 that will spill over into 2014 and in some cases even into 2015.

The debate over extending the PTC comes at the same time the Fish and Wildlife Service arm of the Interior Department announced

The Rhode Island State Properties Commission voted to approve the granting of rights-of-way across Scarborough State Beach in order to bring ashore the offshore wind power cable

its first-ever criminal enforcement of bird-protection laws at a wind energy facility. It also comes at a time when the petroleum industry was hit with its ninth fine related to the death of some migratory birds at a refinery tailing pond. Along those lines, we were not surprised that the Rhode Island State Properties Commission voted to approve the granting of rights-of-way across Scarborough State Beach in order to bring ashore the power cable from the state's high profile 30-megawatt, six turbine offshore wind project located in state waters three miles southeast of Block Island, following the rejection of a request to land the cable in the Town of Narragansett.

A recent study conducted by The Wildlife Society found that 888,000 bats and 573,000 migratory birds were killed at 51,630 megawatts of wind power generating stations in 2012

Many opponents of wind farms were pleased that for the first time ever, the Department of Justice (DOJ) levied a \$1 million fine against Duke Energy Renewables, a subsidiary of Duke Energy (DUK-NYSE) for killing more than 150 migratory birds, including 14 golden eagles, at two Wyoming wind farms over the past three years. The fine was parceled out to several conservation funds and the State of Wyoming. A recent study conducted by The Wildlife Society found that 888,000 bats and 573,000 migratory birds were killed at 51,630 megawatts of wind power generating stations in 2012. At almost the same time, the DOJ announced it had negotiated a \$300,000 fine for Phillips 66 Company (PSX-NYSE) over the deaths of 260 migratory waterfowl, mostly teal, killed at the brine-water pond at the Johnson Tank Farm Pond associated with the company's refinery in Borger, Texas. Two-thirds of the fine went to a wildlife center in the area with the balance going to the federal government and the State of Texas.

Last Friday, the Interior Department announced that it has finalized a new rule that will allow renewable energy and other projects to obtain permits to injure, kill or disturb bald and golden eagles for up to 30 years

While the petroleum industry has been repeatedly fined for migratory bird deaths at various industry sites, the renewable power industry had never been fined despite observers repeatedly producing dead bats and birds at wind turbine sites. At the time the DOJ settled with Duke, the Administration announced it would conduct an environmental impact statement to study issuing a 30-year eagle taking (killing) permit to the proposed 3,000-megawatt Chokeycherry and Sierra Madre wind project in southeast Wyoming. Last Friday, the Interior Department announced that it has finalized a new rule that will allow renewable energy and other projects to obtain permits to injure, kill or disturb bald and golden eagles for up to 30 years. Permits are normally granted for five years and subject to renewal, but the 30-year permit life will cover the entire anticipated life of wind farms.

In Rhode Island, where the state government has turned its public utility regulation and other government rules upside down to promote the Deepwater Wind pilot offshore wind farm, it was not a real surprise that the state saw fit to allow the project's power cable to come ashore across one of the top beaches, not only in the state but maybe in all of New England. The cable will run 18 miles from the six wind turbines to shore. It will be buried to a depth of six feet offshore but 10 feet under the sand of the beach, crossing under

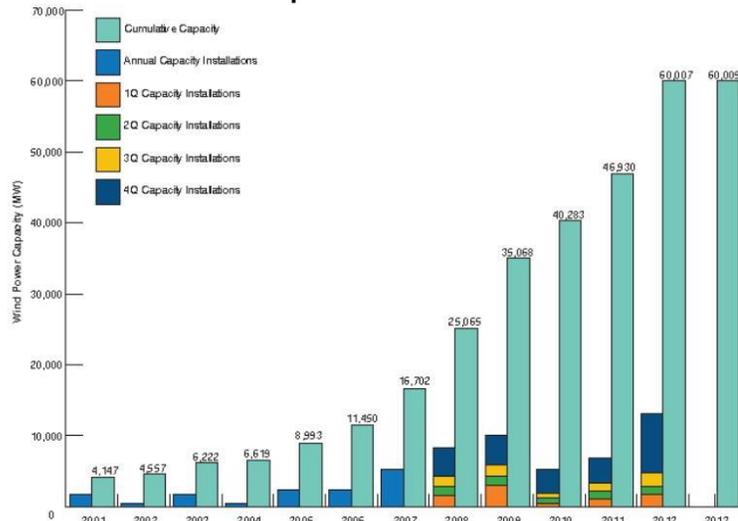
The surplus power will be purchased by the state’s primary electricity provider for \$0.244/kWh, nearly three times the cost of alternative green or natural-gas fired power supplies

The subsidy is now equal to about a third of the average retail electricity cost for industrial users and it exceeds most estimates of the typical operating and maintenance costs for wind power

a state road to meet a switching location to be built by Deepwater Wind. Besides the payments for rights-of-way from the Department of Environment and Department of Transportation, the state will receive a payment for additional landscaping at the beach and annual payments of \$100,000 for ten years for improvements at other state beaches. (The permit must be financially rewarding.) The cable will bring surplus power ashore not used by residents and businesses on Block Island, allowing the utility there to shut down its diesel generators that has made power on the island the most expensive in the nation at \$0.54 per kilowatt-hour (kWh). In return, the surplus power will be purchased by the state’s primary electricity provider for \$0.244/kWh, nearly three times the cost of alternative green or natural-gas fired power supplies. With the cable in place, Block Island residents will be able to receive power from shore when the turbines fail to produce enough electricity.

The PTC has been successful in stimulating the addition of wind energy generating capacity, even if it has been a costly move. Over the roughly 20 years the PTC has been in existence (absent a couple of one-year suspensions), wind generating capacity has grown from 2,000 megawatts (MW) to over 60,000 MW today. Since the subsidy didn’t decrease as wind power technology improved, the PTC’s subsidy increased from 1.5¢/kWh to its present level of around 2.3¢/kWh. The subsidy is now equal to about a third of the average retail electricity cost for industrial users and it exceeds most estimates of the typical operating and maintenance costs for wind power.

Exhibit 7. PTC Has Helped Drive Wind Power Growth



Source: AWEA

The one thing the PTC has accomplished has been a steady growth in wind power generating capacity. According to the American Wind Energy Association there are over 2,300 MW of new wind

If the industry can qualify installations at the average of the past three years, the current PTC would add about \$5 billion to the federal government's budget over the 10 years

generating capacity under construction as of the end of September. Installations of new capacity have averaged less than 8,400 MW annually for the past three years. Actual installations for the first three months of 2013 total only 64 MW. At that pace, the cost of subsidies for new wind generating capacity additions would be minimal. On the other hand, if the industry can qualify installations at the average of the past three years, the current PTC would add about \$5 billion to the federal government's budget over the 10 years new wind farms would receive benefits. The Joint Committee on Taxation of the Congress estimates the PTC cost at \$6.1 billion.

Under this scenario, extending the PTC will cost more than the subsidies for oil and gas

One estimate of the domestic oil and gas industry benefit from federal tax deductions and credits is roughly \$4.3 billion a year. Under this scenario, extending the PTC will cost more than the subsidies for oil and gas. If the ratio is based on the amount of energy produced in a year, given wind's intermittent output, its subsidy value per unit of energy would be substantially greater than for oil and gas. This analysis suggests Congress should reject pressure to extend the wind power subsidy. It is hard to expect politicians who perceive the PTC as a modest down payment for building a greenhouse-gas-free energy system as being willing to stand up and fight the PTC extension. The PTC provides substantial funds for wind farm developers to justify providing grants in states such as Rhode Island in order to warp the state's regulatory rules and enable wind power projects to move forward when their economics are seriously flawed. That fact was demonstrated by the state's public utility commission (PUC) initially rejecting the project as too costly for citizens and their electricity bills, which forced the state's Democratically-controlled legislature with the backing of its then Republican governor to re-write the rules under which the PUC was mandated to evaluate the project. Given the new mandate, the offshore wind farm was approved, but still has yet to turn a single shovel full of dirt. We are hopeful the cloud of year-end budget and debt negotiations will sink the extension of the PTC, but we fully anticipate it will be extended eventually.

2013 Hurricane Season Surprises As One Of Weakest Ever

Following early and often predictions of the 2013 season being an active tropical storm year, it turned out the season was much quieter than originally anticipated

On November 30th, the 2013 hurricane season came to an end, an event that many people may have missed since the entire season was essentially a nonevent. Following early and often predictions of the 2013 season being an active tropical storm year, it turned out the season was much quieter than originally anticipated. The interesting challenge for meteorologists and extreme weather forecasters was explaining how it was that the large scale conditions typically associated with a very active storm year were present, but they essentially never materialized, and the few that did develop were nowhere near as severe as expected. The calm tropical storm/hurricane season can be seen in Exhibit 8, which shows the paths of the few named tropical storms and hurricanes that did form during the season. Not only were there fewer tropical storms than

anticipated, but many of them stayed well away from land or weakened by the time they reached land.

Exhibit 8. Tropical Storms And Their Paths In 2013



Source: weather.unisys.com; CSU

These normally-favorable storm-generating conditions were suppressed by very dry mid-level air off the coast of Africa that combined with an altered flow of the Thermohaline Circulation (THC) on Atlantic sea conditions

The sudden cooling of the Arabian Sea and Bay of Bengal that upset the Indian monsoon conditions and in turn contributed to the dry African air

The key macro meteorological conditions present during the 2013 season included a warm tropical Atlantic basin, the absence of El Niño conditions in the Pacific Ocean that normally ramp up high altitude winds that can rip apart newly formed hurricanes, low tropical Atlantic sea level pressures, and light trade winds. These normally-favorable storm-generating conditions were suppressed by very dry mid-level air off the coast of Africa that combined with an altered flow of the Thermohaline Circulation (THC) on Atlantic sea conditions, meaning that large areas of sinking air prevented storms from forming or weakened those that did form. The large, frequent plumes of dry, dusty air coming off the Sahara Desert contributed to above-average wind shear in the Atlantic basin, which further helped to depress tropical storm formation conditions.

Late last summer, we participated in a webinar hosted by Chris Hebert of Impact Weather discussing the outlook for the remainder of the hurricane season and why the season had not unfolded as anticipated by the forecasters. During the webinar, Mr. Hebert discussed the sudden cooling of the Arabian Sea and Bay of Bengal that upset the Indian monsoon conditions and in turn contributed to the dry African air that was at the heart of the conditions that undercut the formation of tropical storms. It seems few forecasters had focused on that linkage, but according to a response to an October blog about the unfolding weak hurricane season several forecasters who had observed the relationship were not surprised by

its impact. In fact, one of those not surprised was Joe Bastardi, now of *Weatherbell.com*, but formerly the extreme weather forecaster for *AccuWeather.com*.

Exhibit 9. Conditions Limiting Hurricanes Forming



Source: *AccuWeather.com*

He says that flip may explain the 1978-1997 period of rising global temperatures

Mr. Bastardi not only pointed out the shift in the temperatures in the Middle East and Indian Ocean but commented that he had not expected the shift for several more years because those shifts usually happen when the Atlantic Multi-Decadal Oscillation (AMO) was in a cold phase. He says he agrees with Colorado State University's Dr. William Gray's view that the current warm AMO is now entering their last cyclically driven years. Mr. Bastardi went on to highlight that for the East Coast of the U.S., this is a critical period because the combination of a cool Pacific Decadal Oscillation (PDO) and a warm Atlantic AMO is associated with past years in which strong hurricanes hit the region. He also pointed out that the last time we experienced such low activity in the Atlantic and Pacific Oceans was in 1977, which coincided with the climatic shift where the PDO flipped to warm. He says that flip may explain the 1978-1997 period of rising global temperatures. He also believes that the dry Saharan dust may be the product of a changing weather pattern and not its cause. As he believes, this shift is a sign of greater sinking of air, signifying a drying of the atmosphere and the corresponding release of heat rather than keeping it trapped as the Intergovernmental Panel on Climate Change (IPCC) believes, and which underlies the Panel's theory of global warming.

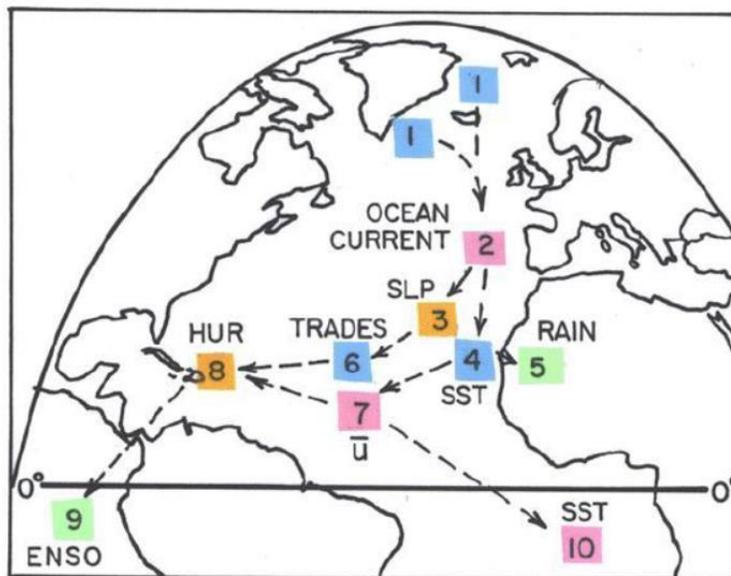
They are particularly concerned about whether there are changes in the relationship between the primary drivers of tropical storm activity and the proxy measures they monitor

The hurricane forecasting team at Colorado State University, Phil Klotzbach and Dr. Gray, recently issued its review of the 2013 tropical storm season. The 66-page report goes to great lengths to try to understand and explain those factors that caused the forecasters to over-forecast storm activity. They are particularly concerned about whether there are changes in the relationship between the primary drivers of tropical storm activity and the proxy measures they monitor that in the past have shown predictive

They believe there is more research needed on the short-term relationships and their shifts on longer term climate patterns

capability. At this point, they believe there is more research needed on the short-term relationships and their shifts on longer term climate patterns. In the report, they presented a map with an accompanying explanation of the interactions of these various climatological forces. We have elected to post both the map and the bulk of the paragraph that explains those shifts in the patterns (corresponding to the numbers on the map) as we doubt we can explain any of this better than they can.

Exhibit 10. Shifting Climatology Factors



Source: CSU

“The favorable changes of Sea Surface Temperatures (SST) in the Main Development Region (MDR) are a consequence of a combination of the ocean’s THC influences on a variety of parameters in the Atlantic’s MDR (Figure 33, our Exhibit 10 above). A stronger than average THC causes more ocean-sinking in area 1. This in turn reduces the strength of the Atlantic gyre. There is then a change in all of the other conditions shown in Figure 33 (Exhibit 10) to bring about more favorable parameters in the MDR for Tropical Cyclone (TC) formation and intensification. This figure illustrates how the changing rate of southward advection of colder water in the east Atlantic (2) brings about alterations of Sea Level Pressure (SLP) (3), SST (4), and rainfall (5). These changes in turn lead to changes in trade wind strength (6) and 200-mb zonal wind (7). Changes in hurricane activity follow (8). These changing conditions bring about weaker trade winds and reduced evaporation, which typically acts to increase SST. It is also found that in periods with a strong THC, El Niño frequency and intensity is typically reduced (9) and Atlantic hurricane activity, particularly major hurricane activity, is enhanced.”

As shown by the actual results, and the comparison against the 1981-2010 median numbers, the CSU forecast missed by a wide margin

A table the CSU forecasters presented showed the history of their 2013 tropical storm forecasts and how the final results compared to modern storm history. As can be seen, the CSU's earliest forecast called for 18 named storms, nine hurricanes and four major hurricanes. In the final forecast in early August, there was no change to the number of named storms anticipated, but the CSU forecasters did reduce by one the total number of hurricanes and major hurricanes expected. As shown by the actual results, and the comparison against the 1981-2010 median numbers, the CSU forecast missed by a wide margin.

Exhibit 11. CSU 2013 Tropical Storm Forecast

ATLANTIC BASIN SEASONAL HURRICANE FORECASTS FOR 2013*

Forecast Parameter and 1981-2010 Median (in parentheses)	10 April 2013	Update 3 June 2013	Update 2 Aug 2013	Observed 2013 Total	% of 1981-2010 Median
Named Storms (NS) (12.0)	18	18	18	13	108%
Named Storm Days (NSD) (60.1)	95	95	84.25	35.75	59%
Hurricanes (H) (6.5)	9	9	8	2	31%
Hurricane Days (HD) (21.3)	40	40	35	3.75	18%
Major Hurricanes (MH) (2.0)	4	4	3	0	0%
Major Hurricane Days (MHD) (3.9)	9	9	7	0	0%
Accumulated Cyclone Energy (ACE) (92)	165	165	142	30	32%
Net Tropical Cyclone Activity (NTC) (103%)	175	175	150	43	42%

Source: CSU

The last year in which there were no major hurricanes was 1994

The CSU team, and virtually every other hurricane forecasting group, is struggling to understand the significance of the mild storm season given the macro climate forces at work. The record for 2013 is remarkable. The 13 named storms with only two hurricanes marks the most named storms in a year in which two or fewer hurricanes formed. In 1931, there were 13 named storms but only three hurricanes formed. The two hurricanes that formed this year were the fewest since 1982 when only two formed. The 35.75 named storm days is the fewest since 2009. The last year in which there were no major hurricanes was 1994. The Accumulated Cyclone Energy (ACE) measure of 30 was the lowest since 1983 when it was 17.

Since 1878, when reliable landfall statistics began to be recorded, the U.S. has never had an 8-year period without a major hurricane making landfall

No major hurricane made landfall on the U.S. coast. The last year a major hurricane made landfall was eight years ago (Wilma, 2005). Since 1878, when reliable landfall statistics began to be recorded, the U.S. has never had an 8-year period without a major hurricane making landfall. Hurricane Humberto, which formed on September 11th, was the second-latest-forming first hurricane of the season. The prior latest-forming hurricane was Gustav in 2002.

Last season was a remarkable one for hurricane forecasters, and in turn America's citizens and the insurance industry breathed a huge sigh of relief. The difficulty the weather forecasters had in predicting the hurricane season highlights issues we have with the IPCC and its climate change forecasts, especially projections for climate conditions some 80+ years in the future. The recent hurricane forecast shows how relationships between weather forces that don't always appear, or that traditionally lead to different weather patterns,

This may be a reason why the CSU team has lost some of its financial support, thus making continuation of their tropical storm forecasting in doubt after early spring 2014

makes predicting storm formation and their paths nearly impossible. This may be a reason why the CSU team has lost some of its financial support, thus making continuation of their tropical storm forecasting in doubt after early spring 2014. We have paid attention to them, along with Joe Bastardi, for years as they seem to have a grip on the historical patterns of conditions that produce weather outcomes, often at odds with those projected by computer models. To us, weather and climate predicting involves more art than strictly science, and contains surprises, even for the most professional of forecasters. This is confirmation that man doesn't fully comprehend how our climate works. As Mr. Bastardi put it, the reason for tropical cyclones is Mother Nature's way of distributing heat out of the tropics to the temperate regions – "in other words nature adapts."

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