
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

The Role Of Natural Gas Grows Despite Economics

Unconventional gas will soon no longer be unconventional

At a recent breakfast conference focused on unconventional resources, the observation was made that unconventional gas will soon no longer be unconventional. As several speakers pointed out, in 2001 less than 1% of the nation's gas supply came from unconventional gas resources, while today it is slightly under 20%. If projections prove correct, natural gas from shales and tight rocks will account for more than 50% of our supply by 2020, assuming the economics for gas improve. This, unfortunately, is the critical ingredient for expanding the role of natural gas and its potential to become the "silver bullet" of U. S. energy policy.

The struggle has been between the technical challenges of extracting hydrocarbons and the economics of the effort

Since the early 1990s, as shale formations began to emerge as a possible source of future gas supply, the struggle has been between the technical challenges of extracting hydrocarbons and the economics of the effort. We have recently been engaged in an email chain exploring the question of what was the catalyst that started the current shale boom, which will be the subject of a future *Musings* article, but suffice it to say that there was no single catalyst in contrast to the conventional belief that it was a eureka moment as E&P professionals discovered that marrying horizontal drilling and multi-stage fracturing would miraculously allow us to extract huge supplies of natural gas. The success really came through trial and error and hard work. Those characteristics, inherent in the genes of E&P professionals, were helped by rising natural gas prices that provided the incentive to seek solutions and, importantly, the cash to do so.

As pointed out by several of the forum's speakers, and in conversations we have had with other experts, for all the thousands of tight gas sands, coal bed methane and gas shale wells drilled in this country, there is likely more about shales that we don't know

Boosting gas demand, as opposed to further improving technology has become more important for improving shale extraction economics

than what we do. As a result, the industry will continue to drill and fracture wells and inch the technology forward and improve the recovery of this potentially huge global hydrocarbon resource. Boosting gas demand, as opposed to further improving technology has become more important for improving shale extraction economics. The alternative of slowing drilling and production could become a disruptive force in furthering the development of technology. As one speaker put it, we are no longer looking at gas shales costing \$10-\$12 per thousand cubic foot (Mcf), but rather it is now in the \$6-\$8/Mcf range thanks to technology. Can we bring it down to \$4/Mcf? That is the challenge.

Increased gas consumption by the nation's industrial sector depends on accelerating the economic recovery

In the meantime we need a stronger economic recovery, both in the U.S. and Europe as they are the principle drivers for increased natural gas consumption, either as dry gas or in the form of liquefied natural gas (LNG) shipped from far off locations around the world. A natural gas recovery requires a stronger economy and in turn an improvement in domestic auto sales, which have shown surprising strength in recent months, and a solution to our housing industry problems. The latter has proved a more difficult problem to solve.

The best chance for increasing natural gas demand is to expand its role in generating electricity. Increased gas consumption by the nation's industrial sector depends on accelerating the economic recovery. Some gas industry executives point to the residential sector's contribution to greater gas use, but that will come slowly as it depends upon new home construction. These executives point out the impact of the public's fascination with electronic gadgets and how that is boosting electricity consumption, but the reality is that demand growth is largely offset by continued improvement in the electricity efficiency of large consuming appliances such as air conditioners, televisions, clothes dryers, ovens and stoves.

Other gas industry executives tout the potential for expanding the use of natural gas in our auto and truck fleets. There are clearly opportunities in this area but the impact will take a very long time to have much impact on the nation's overall gas market. We have had some success, and likely can continue that success, with fleets of buses, garbage trucks, postal vehicles and the like. These are vehicles that travel limited distances and return to a central facility helping to justify the cost of installing natural gas refueling facilities.

They tout the environmental advantages of natural gas versus petroleum fuels, but they seem to ignore the practical and economic issues this switch entails

The gas industry, however, continues to promote the concept of replacing our over-the-road trucking fleet with natural gas powered units. They tout the environmental advantages of natural gas versus petroleum fuels, but they seem to ignore the practical and economic issues this switch entails. The American Trucking Associations (ATA) has studied the issue and reported on the economics this switch imposes on their business. It recently updated the 2009 study with more recent data and experiences of operators. Without going through all the technical challenges encountered, depending

Natural gas trucks sell at a premium ranging from \$45,000 to \$75,000 compared to diesel-powered heavy duty Class 8 trucks

upon the gas-powered engine utilized, the economic challenges are daunting. Both compressed natural gas (CNG) and LNG have a lower energy density than diesel. The ATA states “Because of its lower energy density, CNG is not practical for long-distance, heavy-duty truck applications.” It further says, “LNG...has higher energy content per volume than CNG (although still significantly lower than diesel).”

A major inhibitor for switching the nation’s heavy-duty truck fleet is the cost. Natural gas trucks sell at a premium ranging from \$45,000 to \$75,000 compared to diesel-powered heavy duty Class 8 trucks. There are federal and state tax incentives available for gas-powered truck buyers, but the ATA says these incentives are generally not sufficient to offset the price differential. They also point out that natural gas prices fluctuate just as diesel prices do, and they vary by geographic region. Generally, gas prices are cheaper than diesel, ranging during 2009 between \$0.75 and \$1.50 per gallon. We don’t believe that natural gas fuel for vehicles is taxed to support the highway trust fund, something that would be addressed by the federal government as it begins to lose tax revenues with declining gasoline and diesel fuel sales.

The cost of natural gas refueling stations ranges between \$750,000 and \$1.2 million

Refueling gas-powered vehicles is a major headache for the over-the-road trucking industry. LNG trucks must be refueled at specialized stations configured for specific truck models. Because the fuel is dispensed at between -255 and -270 degrees Fahrenheit, employee training and personal protective equipment is needed. CNG trucks also require specialized refueling. Depending upon the temperature, it may take two or more refueling to make sure the tank is full. Since mobile natural gas refueling is not an option, running out of fuel on the side of the road is a significant challenge and the truck would have to be towed to a refueling location. The cost of natural gas refueling stations ranges between \$750,000 and \$1.2 million.

Spark-ignited natural gas engines have a reduced fuel economy of 7% to 10%

The last major challenge for natural gas-powered trucks is their range and weight, both of which impact the economics of trucking company operations as fuel is the second largest expense of a trucking operation. Spark-ignited natural gas engines have a reduced fuel economy of 7% to 10%. Compression-ignition natural gas engines have about a 1% fuel economy penalty, but they burn a blend of natural gas and diesel fuel. Reduced fuel economy hurts the economic benefits of lower natural gas prices.

Each 119-gallon LNG tank adds approximately 500 pounds to the truck’s weight

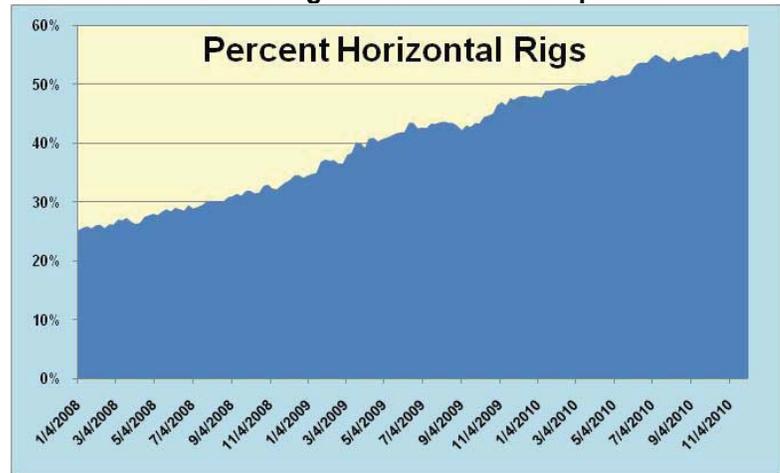
Weight is the biggest problem. Each 119-gallon LNG tank adds approximately 500 pounds to the truck’s weight. Two of these tanks are needed for the truck to have an operating range of 775 miles. A 72-gallon tank adds about 270 pounds to the weight of the truck. A CNG truck equipped with five 15-gallon tanks (300-350 mile operating range) would weigh 1,200 pounds more than its diesel counterpart. This incremental fuel system weight reduces the

Gas producers compound their weak economic position by continuing to drill wells and bring highly productive ones on stream

revenue-carrying capacity of the truck worsening its economics and largely, if not totally, offsetting the fuel economy savings.

While waiting and pushing for gas demand to increase, gas producers compound their weak economic position by continuing to drill wells and bring highly productive ones on stream. What we have witnessed this year, however, has been a shift in drilling focus from dry natural gas and toward wet gas and crude oil. This shift has been manifested within a steadily increasing share of active rigs drilling horizontally.

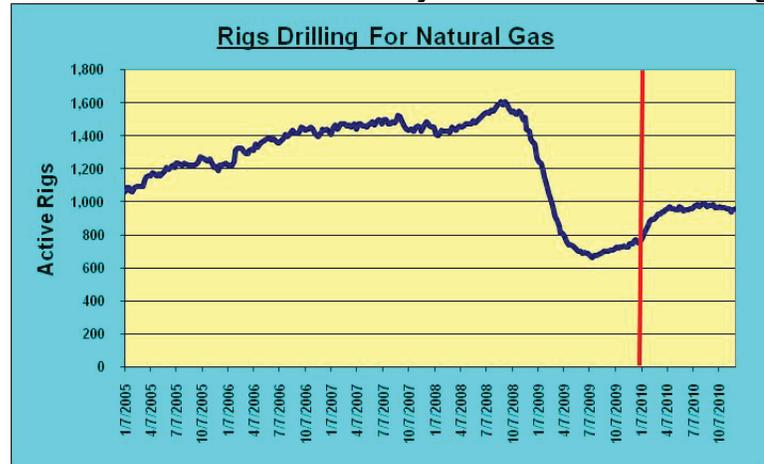
Exhibit 1. Horizontal Rig Share Remains In Uptrend



Source: Baker Hughes, PPHB

The impact of horizontal drilling and gas shale well productivity has been clearly demonstrated by the long-term trend in the number of drilling rigs seeking natural gas. Most analysts were mystified by the quick recovery in the gas rig count following the financial crisis in the

Exhibit 2. Gas Shale Productivity Reduces Need For Drilling



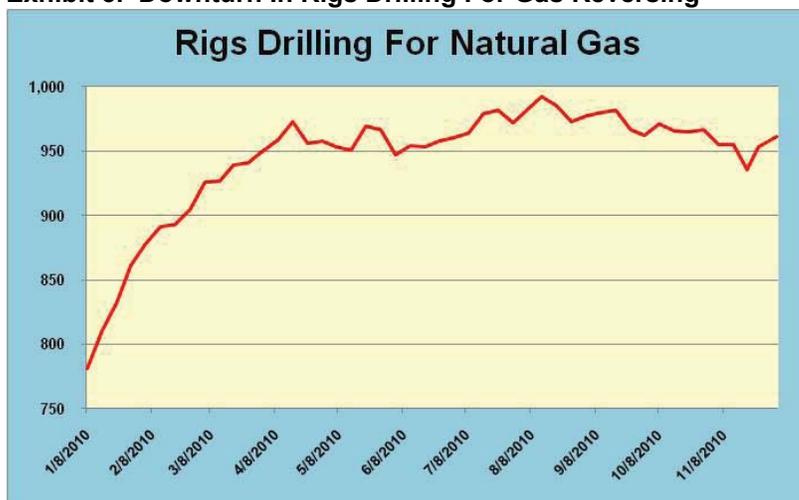
Source: Baker Hughes, PPHB

The belief was that low gas prices were finally beginning to alter producer attitudes that they should drill to hold acreage regardless of gas prices

face of a growing natural gas supply glut and low gas prices. Rational behavior argues that low gas prices should slow or stop gas drilling, but what wasn't fully appreciated was the impact of the gas shale land grab with associated drilling requirements considered critical to become a successful gas shale producer.

In recent weeks, analysts were encouraged by the drop in the number of drilling rigs seeking natural gas. The belief was that low gas prices were finally beginning to alter producer attitudes that they should drill to hold acreage regardless of gas prices. Last week's Baker Hughes (BHI-NYSE) drilling rig count data disproved that view as gas rigs have returned to an uptrend.

Exhibit 3. Downturn In Rigs Drilling For Gas Reversing



Source: Baker Hughes, PPHB

As long as we keep drilling highly productive gas shale wells, we probably won't see a meaningful increase in the total number of active rigs drilling for gas

We expect horizontal drilling to continue to grow as a share of all drilling activity as the technology has proven successful and, in many regions, is the environmentally-preferred approach for extracting hydrocarbon resources. As long as we keep drilling highly productive gas shale wells, we probably won't see a meaningful increase in the total number of active rigs drilling for gas. Likewise, until the economics of low gas prices overwhelm the need to drill to hold leases, a significant decline in rigs drilling for natural gas will not occur soon.

Looks Like Offshore O&G Regulated To Energy Backseat

This past March, the hopes of the oil and gas industry were boosted by President Barack Obama's announcement that he and his administration were going to support an expansion of offshore exploration and production by opening up areas off the East Coast for drilling in the 2012-2017 leasing program. Initially, President Obama suggested only allowing seismic data-gathering operations

The hypocrisy of the announcement was that the Obama administration and the Democratically-controlled Congress were working feverishly to secure Republican votes in support of pending environmental legislation

No sales will occur until a new environmental assessment of the Gulf has been completed

to be allowed to be conducted. The oil and gas industry, however, firmly believed that once seismic operations commenced, it would inevitably follow that exploration and production would be allowed. Barely three weeks later all these efforts were frozen as Transocean's (RIG-NYSE) Deepwater Horizon drilling rig exploded in a fireball killing 11 workers following the blowout of BP's (BP-NYSE) Macondo well that the rig was drilling and, which ultimately led to the worst oil spill in U.S. history and one of the globe's worst environmental disasters ever.

President Obama's announcement, as he stood before a U.S. fighter jet at Andrews Air Force Base, was remarkable in that he said his decision to open up the East Coast and part of the Eastern Gulf waters off the coast of Florida, was not based on political ideology but driven by science. The hypocrisy of the announcement was that the Obama administration and the Democratically-controlled Congress were working feverishly to secure Republican votes in support of pending environmental legislation. Last week, when Interior Secretary Ken Salazar announced the reversal of the president's decision, he stated, "As a result of the Deepwater Horizon oil spill, we learned a number of lessons, most importantly that we need to proceed with caution and focus on creating a more stringent regulatory regime." This decision continues a string of Obama administration actions demonizing the oil and gas industry, which are based on politics and not science.

Sec. Salazar's decision about the next five-year drilling plan means that not only will the East Coast and Eastern Gulf of Mexico remain off-limits to the oil and gas industry, but also that the government will postpone all planned Gulf of Mexico lease sales until late 2011 or early 2012. No sales will occur until a new environmental assessment of the Gulf has been completed. After canceling last August's Gulf lease sale due to the continuing BP oil spill, the government's action means the oil and gas industry will go nearly two years without being able to acquire new acreage for exploration.

Exhibit 4. Lease Sale Plan Reverses Obama Decision



Source: The Wall Street Journal

Companies acquire large blocks of acreage hoping that a discovery on one block may extend to adjoining blocks, but many times that does not happen

That does not appear to be of concern to the Obama administration. Sec. Salazar pointed out that the industry has nearly 29 million out of 43 million acres under lease that have not been developed. He stated, "There's plenty of opportunity for oil and gas companies to develop these additional resources." His statement displays a fundamental misunderstanding of the workings of the oil and gas business. Companies acquire large blocks of acreage hoping that a discovery on one block may extend to adjoining blocks, but many times that does not happen. Once a determination is made that the additional acreage doesn't contain prospective oil and gas reserves, the leaseholder stops expending any effort on the additional acreage pending its return to the government at the end of the primary lease term. As Jack Gerard, president of the American Petroleum Institute put it, "It's a red herring to suggest there are resources sitting there yet to be developed."

The de facto deepwater drilling moratorium presently in place following the lifting of the official deepwater drilling moratorium in October is beginning to bite deeper into the offshore business. Last week, Ensco plc (ESV-NYSE) announced it had arranged a sub-lease for its new-build deepwater semi-submersible drilling rig that was recently mobilized to the Gulf of Mexico. The rig will shortly begin sea trials and once rig acceptance procedures are completed the rig will mobilize to offshore French Guiana to drill an estimated three-month-long well for Tullow Oil plc (TLW.L) and its partners. After drilling the well, the rig will return to the Gulf of Mexico to commence a two-year contract with Cobalt International (CIE-NYSE) the original leasee for the rig. The original contract will not be shortened by the sub-lease, estimated to be 140 days, but Cobalt gains extra time to try to secure a drilling permit from the Bureau of Energy Management, Regulation and Environment (BOEMRE).

Marathon notified the company of its intent to declare force majeure on its contract the Noble Jim Day rig due to the company's inability to secure drilling permits

At the end of last week, Noble Corporation (NE-NYSE) announced that Marathon Oil Company (MRO-NYSE) had notified the company of its intent to declare force majeure on its contract for the newbuild deepwater semisubmersible drilling rig Noble Jim Day due to the company's inability to secure drilling permits. A further news report over the weekend suggested that other oil companies were discussing their drilling rig contract commitments with the rig owners due to the lack of drilling permits.

But he cautioned there would come a time when Shell couldn't justify spending money on idle equipment

Dave Lawrence, Executive Vice President Exploration for Royal Dutch Shell plc (RDS.A-NYSE), told attendees at the October meeting of the National Ocean Industries Association (NOIA) that while his company was optimistic it would receive deepwater drilling permits to start drilling before the end of 2010 it has been prepared to absorb the cost of keeping rigs and other equipment under contract in the interim. But he cautioned there would come a time when Shell couldn't justify spending money on idle equipment and he worried about what that would do to the offshore oilfield service industry's ability to respond to the granting of future drilling permits.

The new permitting process was proceeding slowly because whenever a question arises, the review stops

A senior executive from Cobalt also presented at NOIA and commented on how the company was not hearing from BOEMRE on substantive issues dealing with the permitting process. A comment made by a member of the industry panel presenting at the meeting was that the new permitting process was proceeding slowly because whenever a question arises, the review stops and the permit and the question is returned to the company for a response. Once an answer is provided, the review process then begins anew. This “by the book” review is slowing the process dramatically.

The delay puts Shell’s investment in Alaska at risk

Mr. Lawrence also expressed concern about Shell’s exploration effort in the Arctic where the company is proposing to drill a well off the coast of Alaska, but has yet to be granted all the necessary approvals. Sec. Salazar said that the pending lease will be honored, but a drilling permit will not be issued until a new environmental review has been completed along with Shell providing information about how it will meet additional spill response requirements. Combined, these additional conditions may push drilling back by a year or more. The delay puts Shell’s investment in Alaska at risk. So far the company has acquired 400 offshore leases at a cost of \$3 billion, yet has not drilled one well.

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We suggested on April 21st while the Deepwater Horizon rig was still burning that the U.S. offshore oil and gas business had been changed forever. It would never again be what it was before April 20th. When the deepwater drilling moratorium was put in place, we speculated it would last at least as long as it took for the presidential commission appointed to investigate the causes of the BP Macondo spill to deliver its report and recommendations. At the time the formation of the commission was announced, its life was to extend until December. The fact that it took nearly a month to appoint all the commission members, and then several more weeks before its first meeting, the commission’s life span was extended into early January. We assume it is still on that adjusted time schedule.

Now it looks like the recovery may not start until early 2011

We continued to hold to our original deepwater drilling moratorium timetable, but we failed to consider how political desperation would force the Obama administration to terminate the moratorium early to try to save the careers of some Democratic congressional politicians. Since there remains a de facto moratorium because no new deepwater drilling leases are being issued, we’re guessing our timetable for when the industry recovery might start is still pretty much on schedule – the end of 2010 or early in 2011. Now it looks like the recovery may not start until early 2011.

Given our timetable, we never expected a mass exodus of drilling rigs and other offshore equipment to begin before late 2010. The next big data point reflecting the health of the industry will be the release of Wall Street surveys of oil and gas company capital spending expectations for 2011. Just how real will those initial projections be? We suspect capital budgets will have more

contingency plans associated with them than in any year in the recent past; therefore we will view these surveys with a high degree of skepticism. Unless BOEMRE unleashes an avalanche of drilling permits by year-end, expect the Gulf of Mexico recovery in 2011 to be agonizingly slow.

Mary Meeker And The Future Of Clean Energy Technology

The financial media was fixated on the move and its significance, calling it the “end of an era”

Last week, Kleiner Perkins Caufield & Byers, characterized as “the blue-blooded Silicon Valley venture capital firm,” which was behind dotcom hits such as Netscape and Amazon (AMZN-Nasdaq), and the current workplace of former Vice President Al Gore, announced the hiring of Mary Meeker, a former analyst with Morgan Stanley (MS-NYSE) who is known as the “Queen of the Net.” The financial media was fixated on the move and its significance, calling it the “end of an era.” As the *Financial Times* put it, “Her departure brings the curtain down on an era in Wall Street stretching back to the late 1990s, when she was among a group of star analysts and bankers who helped fuel the tech and telecoms bubble – only to attract criticism and scrutiny from regulators in the bust that followed.”

Under attack in this investigation is what is known in the investment community as the “mosaic theory”

The job change came at the same the Securities and Exchange Commission (SEC) and federal investigators were ramping up their wide-ranging investigation of hedge funds and the “expert networks” that supplied them information. Under attack in this investigation is what is known in the investment community as the “mosaic theory” by which professional investors and research analysts work to gather lots of bits of data about an industry or a company and piece it all together to attempt to understand what the current health of the business is and possibly what direction it is heading. The whole idea is that by piecing these individual bits of data together, the answer will emerge as the picture takes shape. The investor who can either create a clearer picture faster will have a competitive edge that will enable him to make investment moves earlier and reap greater returns.

Reg FD created the tsunami of conference calls of quarterly earnings results and investment presentations

In this case, however, the SEC is investigating whether the bits of data, supposedly insignificant in and of themselves, are actually inside information, the use of which constitutes an illegal act in which knowledge of confidential market-moving news is used to secure an unfair competitive advantage by an investor. If the SEC restricts the use of intelligence-gathering techniques used by Wall Street research analysts and investment professionals to put together these mosaics and characterizes the techniques as inside information, the investment research business will be further neutered as it was following the implementation of Reg FD (Fair Disclosure) that restricted the dialogue between investment professionals and company managements when not conducted in an “open” environment. Reg FD created the tsunami of conference calls of quarterly earnings results and investment presentations.

Kleiner made a big splash in the financial community with its commitment to emphasize investing in alternative-energy projects, or “green tech” as Kleiner termed it, over new technology start-ups

One investment it made was in a seismic technology start-up company that was applying its secretive technology to drill wells around the world hunting oil and gas reserves

The message was clear – the future of the energy business was in clean tech and the center of the new energy industry was moving from Texas to Silicon Valley

But what does Ms. Meeker’s job change have to do with clean energy? Back in 2005, Kleiner, the then 33-year old venture capital firm with an incredible success record of returning over \$10 billion to its investors in 1997-2007 and led by its preeminent partner, John Doerr, made a big splash in the financial community with its commitment to emphasize investing in alternative-energy projects, or “green tech” as Kleiner termed it, over new technology start-ups. In late 2007, to further the firm’s commitment, Mr. Doerr hired as a Kleiner partner, his pal Mr. Gore, the star of An Inconvenient Truth, the book and movie sensation about the climate horrors descending on this planet due to rising carbon dioxide emissions. The success of Mr. Gore’s effort led to his being awarded the Nobel Peace Prize.

Mr. Doerr was all over the media and investment press in 2007 and 2008 preaching his belief about future investment opportunities in green tech. The firm raised a \$500 million Green Growth Fund in the spring of 2008 and ramped up its efforts in green investing. One investment it made was in a seismic technology start-up company that was applying its secretive technology to drill wells around the world hunting oil and gas reserves, a far cry from the typical venture capital opportunity. The company, Terralliance Technologies, was backed with hundreds of millions of dollars, including \$93 million from Kleiner, which may be the firm’s largest single investment. In the summer of 2008, Terralliance was close to securing a \$1.1 billion investment from Temasek, the sovereign wealth fund of Singapore, which would have given Terralliance a \$4.4 billion valuation, and which prompted speculation it would shortly lead to an initial public offering worth \$60 billion. Before the deal could be sealed, the company imploded resulting in the founder being demoted, then fired and ultimately sued for stealing trade secrets. High profile investors lost money and the investment became a huge black eye for Kleiner. (The story of this investment that turned bad is well covered in *Fortune* magazine articles.)

In late November of 2008, the Rice Alliance held a jam-packed luncheon meeting presentation by two Kleiner professionals entitled, Solving the Energy Crisis through Clean Tech Investing. The talk had two subtitles, one stating: “How a leading Silicon Valley venture capital firm is tackling renewable energy,” and the other: “What Texas must do to retain energy leadership.” At that lunch, the message was clear – the future of the energy business was in clean tech and the center of the new energy industry was moving from Texas to Silicon Valley.

Fast forward to last week and we learn that the future investment thrust of Kleiner will be back in technology. In response to a question during an interview conducted by two *Fortune* magazine writers, Kleiner Managing Director Ted Schlein acknowledged that 80% of its two new funds being raised will be allocated to tech investing, but he went on to defend the firm’s investments in other non-tech businesses. Mr. Schlein stated, “I think it’s true that a

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At a cost of \$800,000, the power savings represents a 54-year payback!

larger percentage will go into what we call digital. And that's a reason why we've added Mary to the mix, just like two years ago we added Bing Gordon and Chi-Hua Chien. But what we've effectively done over the past several years is to build a green tech practice, and that's not going anywhere. Neither is our life sciences strategy.”

Mr. Schlein might have chosen his words poorly. In describing the firm's commitment to green tech and life sciences investments, he said “and that's not going anywhere,” which one could say means they're not successful. This conclusion is supported somewhat by comments made at a recent clean tech investment conference when Mr. Doerr said, “If we'd been able to foresee the crash of the market, we wouldn't probably have launched a green initiative, because these ventures really need capital. The only way in which we were lucky, I think, is that the government stepped in, particularly the Department of Energy. Led by this great administration that put in place these loan guarantees.”

According to one article, Kleiner has had two successful investment exits this year. Biofuel company, Amyris (AMRS-Nasdaq), went public but provided only a modest return. Solar thermal start-up, Ausra, was purchased by Areva (ARVCF.PK) but terms of the transaction have not been released suggesting it was probably only a modest success. The most promising investment may be Bloom Energy, the developer of large fuel cells that power industrial facilities and potentially upwards of 100,000 homes. The article suggested that Bloom was looking for another \$50 million earlier this year before going public, but also supposedly has already consumed \$400 million. That estimate may be high, as Mr. Doerr said that green tech companies “required ten times as much capital” as traditional tech companies. He said that Google (GOOG-Nasdaq) needed \$25 million to reach its IPO, meaning that Bloom will need \$250 million to reach its IPO. Mr. Doerr also suggested that Bloom will take “nine years to a successful public offering: indicating that the IPO would not come before 2011.

The Bloom Box has been highly touted for its energy saving capability. We question that view based on the numbers in the article we read about this successful product. Supposedly these units sell for \$800,000 each, although the company says it expects to be producing and selling a residential unit within the next 5-10 years at a cost of \$3,000. That sounds like IPO marketing hype.

According to eBay (EBAY-Nasdaq), the nine Bloom Boxes it has installed have saved the company \$100,000 in power costs in the first nine months. That sounds impressive until we do a little math. Those savings translate into about \$11,000 per month, or \$1,235 per box per month. At a cost of \$800,000, the power savings represents a 54-year payback! If electric power costs jump, the payback time will fall, but it has a long way to go to attract many companies. As Sean Parker, the entrepreneur behind Napster and Facebook put it

Without private capital can the government provide all the funding for green tech?

recently when discussing venture capital and private equity investment opportunities, "It's not clear anyone will make money on their green tech investing. It looks like it was a bubble."

Without private capital can the government provide all the funding for green tech? No! But then again through legislation (questionable) and regulation (likely) the government can drive capital to support the only businesses that will be able to provide products in various markets such as electric cars, biofuels and fuel cells, for example. This is not how capitalism works best.

Wind Energy Advances; Remains White House Darling

The Massachusetts Department of Public Utilities approved the power purchase agreement between Cape Wind and National Grid

The nation's first offshore wind energy project to be situated in the waters of Nantucket Sound offshore Massachusetts moved one step closer to realization with the recent Massachusetts Department of Public Utilities (DPU) order approving the power purchase agreement (PPA) between Cape Wind and National Grid (NYSE). The agreement covers the sale of half of the expected 468 megawatts of power to be generated from the 130-turbine wind farm over the contract's 15-year life. National Grid will pay Cape Wind 18.7 cents per kilowatt-hour for the electricity produced by the turbines. The price will escalate annually over the contract's life at a 3.5% per year rate. For the average National Grid electricity customer in Massachusetts who consumes 618 kilowatt-hours per month, it will raise their bill by \$1.50.

The decision marks the first approval of a long-term power contract under Massachusetts' 2008 Green Communities Act

The decision by the Massachusetts DPU is significant for two reasons. First, it sets the Cape Wind project on a track to become the nation's first offshore wind energy project after its nine-year journey from concept to construction. Second, the decision marks the first approval of a long-term power contract under Massachusetts' 2008 Green Communities Act that dictates how much renewable energy local utilities must purchase. As a result of the extensive vetting of the political and economic arguments surrounding this wind energy project, the PPA establishes a precedent for how future offshore wind energy and other renewable energy projects will be developed in the state.

Cape Wind continues to negotiate the sale of the remaining half of its expected power supply and anticipates that a second contract will mirror the terms and conditions of the National Grid agreement. That should ensure a less arduous review and approval process and thus a quicker approval. The order approving the National Grid agreement was 351 pages long and incorporated the DPU's review that featured 17 interveners, 13 days of hearings, three public hearings, 838 exhibits and nearly 3,000 pages of testimony. The extent of the review and the length of the order reflected the anticipated appeals of the decision.

The Alliance and others have argued that the price of power agreed to was well above the cost of alternative power supplies available and that the DPU was stacked with political appointees

The DPU, in a second order, denied a request by the Alliance to Protect Nantucket Sound, Cape Wind's primary opponent, to reopen the record to admit more evidence. Alliance's President and Chief Executive Officer Audra Parker stated immediately following the orders, "We fully anticipate appealing this political ruling." The Alliance and others have argued that the price of power agreed to was well above the cost of alternative power supplies available and that the DPU was stacked with political appointees of Massachusetts Gov. Deval Patrick, a strong supporter of Cape Wind. The Alliance appeal will end up in the state Supreme Judicial Court, which, in October, ruled in favor of another state agency's decision to approve Cape Wind.

Cape Wind still needs to secure permits from the Army Corps of Engineers and the Environmental Protection Agency, although both organizations have indicated that they anticipate issuing the permits

One wonders, however, whether the DPU would have endorsed the PPA had Gov. Patrick been defeated in his recent re-election bid. His Republican opponent was opposed to Cape Wind and in favor of cheaper alternative renewable power supplies. National Grid doesn't serve power markets on Cape Cod and Martha's Vineyard, although it does serve Nantucket and other areas of Massachusetts. It is possible that the Republican gubernatorial candidate, had he been elected, might have pushed for the Cape Wind power contract to be put out for bid rather than being exclusively negotiated between the two parties, as a way to make sure that Massachusetts electricity customers paid the lowest feasible power price.

Cape Wind still faces further court challenges. The Alliance has joined with a group of organizations in a suit against the federal government challenging its approval of the project. The Federal Aviation Administration's approval of the 440-foot turbines also faces legal challenges. In addition, Cape Wind still needs to secure permits from the Army Corps of Engineers and the Environmental Protection Agency, although both organizations have indicated that they anticipate issuing the permits. Assuming Cape Wind survives this legal gauntlet, the firm's current nine-year saga, which started in 2001, would come to an end and it would be able to begin construction sometime next year.

The Obama administration has beaten the wind-energy-as-a-jobs-creator drum

You may remember that Cape Wind was a "green energy" project that received the highest attention from the White House. Last April, Secretary of the Interior Ken Salazar ventured to Boston to say he was granting federal approval for construction of the offshore wind project. This was his first official act after expounding on the huge energy potential of East Coast winds the prior year. Since that time, the Obama administration has beaten the wind-energy-as-a-jobs-creator drum. So far there have been no offshore wind projects developed, only plans for new wind farms that remain mired in legal and economic challenges and, in the case of Cape Wind, opposed by some high-powered business and political individuals. The politics of the East Coast, and especially New England, has kept the Obama administration focused on how to move wind energy projects forward to kick-start these job creation projects.

I'm sure there are many people in the offshore oil and gas industry, and even onshore participants, who would welcome that sentiment about their industry

Two weeks ago, Sec. Salazar announced the launch of a "Smart from the Start" wind energy initiative for the Atlantic Outer Continental Shelf to facilitate siting, leasing and construction of new projects. While acknowledging the historic significance of the Cape Wind project, Sec. Salazar pointed out that to fully harness the economic and energy benefits of the offshore, the government needed "to implement a permitting process that is efficient, thorough, and unburdened by needless red tape." I'm sure there are many people in the offshore oil and gas industry, and even onshore participants, who would welcome that sentiment about their industry.

BOEMRE believes that to confirm that this competitive interest does not exist can take from six to 12 months to complete, a time span the department finds detrimental to the development of the nation's offshore East Coast wind resources

The Energy Policy Act of 2005 requires the Secretary of the Interior to issue renewable energy leases competitively unless there is a finding of no competitive interest. In order to fulfill this obligation, the BOEMRE is required to determine if there is competitive interest in a lease area when it receives an unsolicited proposal from a wind energy developer. It accomplishes this determination by issuing a Request for Interest (RFI), published in the *Federal Register*. If no other qualified developer expresses an interest in the proposed lease area, BOEMRE can proceed with the noncompetitive lease process.

BOEMRE also proposes areas for renewable energy development on the Outer Continental Shelf through similar RFI notices. In cases in which only one qualified developer responds to the RFI, BOEMRE is then required by regulation to follow the process for an unsolicited proposal to issue a noncompetitive lease, requiring a second RFI to confirm that no competitive interest exists. This latter step BOEMRE finds redundant and seeks to eliminate through a revision of the rules. BOEMRE believes that to confirm that this competitive interest does not exist can take from six to 12 months to complete, a time span the department finds detrimental to the development of the nation's offshore East Coast wind resources.

We find it interesting that offshore wind has procedures to allow for developers to find a site and start the offshore leasing process on their own

The proposed lease process revision has been published in the *Federal Register* and will be open for public comment for 30 days. If BOEMRE does not receive any significant adverse comments on the rule change, the revision will go into effect 30 days after the end of the comment period.

We find it interesting that offshore wind has procedures to allow for developers to find a site and start the offshore leasing process on their own while the oil and gas companies interested in securing offshore acreage need to qualify and wait for a regularly scheduled lease sale. Reading about the proposed offshore renewable resource leasing proposal took us back to pre-1983 days and area-wide offshore oil and gas leasing in the Gulf of Mexico. During the earlier period, oil and gas tracts put up for auction had to be nominated in order to be included in the lease sale. That meant that at least two oil and gas companies had agreed that a particular offshore lease block was something they were interested in. As we

In order to deviate from the crowd with new exploration strategies, oil companies had to lobby a friendly competitor for support to include the block in the lease sale

found after the switch to area-wide leasing, the previous leasing system restricted innovative E&P strategies in two ways. First, exploration ideas became fairly uniform as all the companies were looking at the same characteristics on the blocks of acreage being proposed for leasing and concluded the same things about their potential; and secondly, in order to deviate from the crowd with new exploration strategies, oil companies had to lobby a friendly competitor for support to include the block in the lease sale.

Some of these off-beat theories proved successful and others didn't

What we witnessed with the advent of area-wide leasing was oil and gas companies trying radically different exploration strategies. This meant that oil and gas companies often bought up multiple blocks of acreage in an area to insure that if their theory about where and how oil and/or gas was deposited under the sea floor proved correct they would have the maximum exposure. So what we saw in the early area-wide lease sales was numerous single company bids on multiple adjoining blocks of acreage. Some of these off-beat theories proved successful and others didn't. As a result, there was a jump in the amount of Gulf of Mexico acreage eventually returned to the government undrilled as exploratory wells on one block often condemned the E&P theory and, as a result, the multiple blocks of adjoining acreage.

But then again we have seen the administration's effort to stop drilling turn into bold statements about their positive intentions from the early termination of the deepwater drilling moratorium

There is little doubt that the Obama administration's energy policy favors renewables at the expense of fossil fuels. How else can one square the Interior Department's effort to accelerate the leasing schedule for East Coast offshore acreage for wind energy development, while at the same time dragging its feet over the status of an already scheduled Gulf of Mexico offshore oil and gas lease sale. But then again we have seen the administration's effort to stop drilling turn into bold statements about their positive intentions from the early termination of the deepwater drilling moratorium. The department has merely left the foot-dragging to the bureaucrats charged with issuing drilling permits.

Optimism about the potential for offshore wind power to eventually supply all the electricity needed along the East Coast

A recent article in *The Houston Chronicle* highlighted the challenge Shell is having in securing a deepwater drilling permit. This comes after an optimistic statement by Mr. Lawrence at the recent NOIA meeting, in which he said his company had filed permits that met the new BOEMRE requirements and it expected to be back drilling before year-end. As we start December, the optimism for meeting that timetable is evaporating.

What hasn't died is the Obama administration's and wind proponent's optimism about the potential for offshore wind power to eventually supply all the electricity needed along the East Coast, something Energy Secretary Chu and Interior Secretary Salazar have mentioned in the past. In September, a study was released by Oceana, an ocean conservation group, claiming that the densely populated U.S. East Coast could meet half its electricity needs, or roughly 127 gigawatts of power, from offshore wind power.

All we need to do is build 30,000 to 50,000 wind turbines!

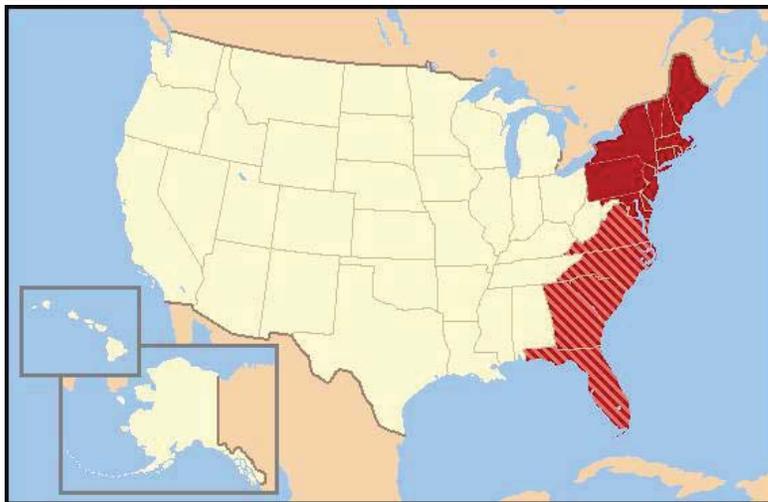
Achieving this goal would save the residents \$36 billion in energy costs over a 20-year period and create 133,000 to 212,000 installation and maintenance jobs a year. All we need to do is build 30,000 to 50,000 wind turbines!

The Oceana study concluded that three coastal states, Delaware, Massachusetts and North Carolina, could generate enough electricity from offshore wind to equal their current electricity generation needs. These states could entirely eliminate the need for fossil fuel-based electricity generation plants. Three other states, New Jersey, Virginia and South Carolina could replace 92%, 83% and 64%, respectively, of their fossil fuel-based electricity generation capacity and replace it with wind power.

For those who are worried about the esthetics of this project what would 30,000 to 50,000 wind turbines mean?

For those who are worried about the esthetics of this project, as the late Senator Ted Kennedy was about the Cape Wind turbines spoiling his view from the Kennedy family compound in Hyannis on Cape Cod, what would 30,000 to 50,000 wind turbines mean? A typical 2.5 megawatt wind turbine has a blade diameter of 100 meters (330 feet) and stands 295 feet tall. The newer and larger 5 megawatt turbines have blade diameters that are about 415 feet, and given their need to be placed high enough off the surface of the water so as to not be impacted by storm-driven wave action, will stand 440-460 feet tall.

Exhibit 5. Is East Coast Wind Turbine Barrier Desirable?



Source: Wikipedia

30,000 turbines will require eight rows of turbines and 50,000 turbines would need 13 rows

The entire length of the East Coast from Maine to the tip of Florida is 2,500 miles long, or 13,200,000 feet. Conventional spacing for wind turbines in a wind farm is 7-8 diameters apart. When we include the operating turbine within the spacing requirement and average the distance, it means there will be about 3,500 feet between turbines. At that spacing, 30,000 turbines will require eight rows of turbines and 50,000 turbines would need 13 rows. Then we need to figure

Offshore wind farms would grow to either 15 or 25 rows of wind turbines, expanding the width of the farms to nine or 15 miles wide, while still stretching the full 2,500-mile length of the coastline

out how much space between the rows is required. According to conventional spacing, it is either seven or eight diameters. If we average that distance, it represents about 6-tenths of a mile between rows. So for the smaller number of wind turbines, we are describing a wind farm 2,500 miles long and five miles wide. If we need the larger number of turbines, then the wind farm expands to eight miles wide. These dimensions are mindboggling!

Recent wind turbine research has concluded that to optimize their performance, the spacing needs to double. That means these offshore wind farms would grow to either 15 or 25 rows of wind turbines, expanding the width of the farms to nine or 15 miles wide, while still stretching the full 2,500-mile length of the coastline. Given that this wind turbine barrier would disrupt commercial and military shipping, there would need to be corridors opened in the barrier meaning that wind turbines would need to be displaced, either shrinking the capacity of the wind farm or repositioning the turbines and adding to the width of the farms. Maybe this proposal will create an entirely new tourist industry – wind farm viewing, just as tourists go offshore whale watching. Speaking of which, we would be going full circle in our energy industry from whale oil to wind power.

A Record Hurricane Year But U.S. Dodges A Bullet

Prospects were that it would be an above-average storm season, which was disconcerting to many as the 2009 season had generated extremely low storm activity

The extremely active 2010 hurricane season ended last Tuesday night with little damage to either the U.S. or the oil and gas industry. When the early 2010 hurricane forecasts were rolled out in December 2009, prospects were that it would be an above-average storm season, which was disconcerting to many as the 2009 season had generated extremely low storm activity. At the time of these early season forecasts, the strength or development of the conditions that would influence exactly how active or mild the storm season might be were unclear. As these conditions clarified, storm forecasts began to be ratcheted up.

The upward trend in storm forecasts can be demonstrated through those made periodically by the hurricane forecasting team at Colorado State University (CSU) led by Professors Phillip Klotzbach and William Gray. From the range of 11-16 named storms the next forecast was at the upper end of the range, only later to be followed by forecasts that exceeded the top end of the original forecast.

Exhibit 6. 2010 Storms About As Forecast

Forecast Parameter and 1950-2000 Climatology (in parentheses)	2010	2010 Forecast				2009
		Aug. 4, 2010	June 2, 2010	Apr. 7, 2010	Dec. 9, 2009	
Named Storms (9.6)	19	18	18	15	11 - 16	10
Named Storm Days (49.1)	88.25	90	90	75	51 - 75	45.00
Hurricanes (5.9)	12	10	10	8	6 - 8	4
Hurricane Days (24.5)	37.50	40	40	35	24 - 39	18.00
Intense Hurricanes (2.3)	5	5	5	4	3 - 5	2
Intense Hurricane Days (5.0)	11	13	13	10	6 - 12	4.00

Source: Colorado State University, PPHB

It was during the late spring as Atlantic Basin sea surface temperatures began breaking records for heat and the South

The 19 named storms, 12 hurricanes and five intense hurricanes were 198%, 203% and 217% of the 1950-2000 average for named storms, hurricanes and intense hurricanes, respectively

Pacific's developing La Niña weather event grew stronger that it became clear that most storm forecasts were too conservative. At that time, nearly every extreme weather forecaster upped his forecast. In terms of the number of named storms, hurricanes and intense hurricanes, the CSU team increased their forecasts by roughly 25%. While the actual results for named storms and hurricanes were above the CSU forecast, it was largely on target in its estimate of the number of intense hurricanes and importantly, extremely close on the number of named storm, hurricane and intense hurricane days.

What we know about the 2010 hurricane season is that it set a number of records in terms of activity. The 19 named storms, 12 hurricanes and five intense hurricanes were 198%, 203% and 217% of the 1950-2000 average for named storms, hurricanes and intense hurricanes, respectively. The 19 named storms ties 2010 with 1995 and was exceeded only by 2005's 28 named-storm-year. Some forecasters have pointed out that there were 21 named storms in 1933 and 19 in 1887, which were numbered sequentially, but those storm totals predate the National Weather Service's modern storm naming system and we do not know how many tropical depressions were included in those totals. This anomaly was pointed out by AccuWeather's Chief Hurricane Meteorologist Joe Bastardi. He acknowledges that 2010 would rank among the top five most active storm years.

The 12 hurricanes this season tied with 1969 in second place to 2005, which experienced 15 hurricanes. The five intense hurricanes in 2010 has only been exceeded by seven prior years (1950, 1955, 1961, 1964, 1996, 2004 and 2005). The number of named storm days in 2010 is tied with 2008 as the sixth most active year since 1944. This year experienced the most hurricane days and the 11th most intense hurricane days.

There were no Category 5 hurricanes for the third consecutive year

The storm season set a number of other records. There were no Category 5 hurricanes for the third consecutive year. The last time we experienced two or more consecutive years with no Category 5 hurricanes was 1999-2002. The 11 named storms that formed in the period August 22nd to September 29th was the most ever, surpassing the prior record of nine named storms in 1933, 1949, 1984 and 2002. There were five hurricanes in October, which matched 1950 and fell one short of the record in 1870.

Intense hurricanes Igor and Julia attained Category 4 status on September 15th. The only other time two storms reached this level at the same time was on September 15, 1926. There were three hurricanes at one point this year (Igor, Julia and Karl). This achievement has only been recorded eight other times with the last time in 1998.

For all these records, 2010 marked another year with minimal storm

There was no hurricane making landfall on the Florida Peninsula and/or the East Coast for the fifth year in a row

damage to the coastal United States as most of the storms either curved out to sea or landed elsewhere. Bonnie, a minimal tropical storm with 40 mile per hour winds landed in South Florida in August, the only named storm to touch the United States. The last hurricane to make landfall on the U.S. coastline was Hurricane Ike in 2008. The last time we went two consecutive years without a U.S. hurricane landfall was 2000-2001. There was no hurricane making landfall on the Florida Peninsula and/or the East Coast for the fifth year in a row. This is the first time since 1878 when reliable weather records began being collected that there has been no landfall on this coastline for a five-year period. There were seven intense hurricane landfalls in 2004-2005, but since then there has not been an intense hurricane landfall. The last times there were five-year periods without intense hurricane landfalls on the U.S. coastline was 1901-1905 and 1910-1914.

One of the most amazing statistics showing how fortunate we were this year is that it was the first time in recorded history that there were as many as 12 hurricanes in a season with no U.S. landfalls. Every other year, in which there had been at least ten hurricanes, there were at least two landfalls on the U.S. coastline.

These factors contributed to Canada and Mexico bearing a greater brunt of tropical storms this season

One of the reasons for the lack of U.S. landfalls of tropical storms was general weather patterns that persisted over the Atlantic basin and the North American land mass. These factors contributed to Canada and Mexico bearing a greater brunt of tropical storms this season. The Azores/Bermuda high was farther east than usual and there were more strong troughs of low pressure over the U.S. East Coast than usual. In addition, there was stronger than usual high pressure over the U.S. Gulf Coast, which deflected Caribbean storms into Mexico.

Exhibit 7. 2010 Tropical Storm Tracks



Source: Weather Underground

There were fewer shear winds generated in the Atlantic basin, which is an enemy of hurricane formation and strengthening

In the North Pacific basin, prior to and during the storm season, a developing La Niña cooled much of the Pacific Ocean waters. It also creates lighter winds aloft as the air crosses into the Caribbean, Gulf of Mexico and Southern Atlantic basin. As a result, there were fewer shear winds generated in the Atlantic basin, which is an enemy of hurricane formation and strengthening, thus conditions were ripe for an active tropical storm season.

This season was marked by two distinct, but uncharacteristic, tropical storm patterns. There were a large number of storms that formed in the Main Development Region (MDR) located at 10-20° N, 20-60° W, which is an area off the western coast of Africa. Nine storms came from the MDR, matching the number in 1995 and only exceeded by the 11 storms that formed there in 1933. Most of these storms curved out to sea after heading toward the U.S. East Coast.

Exhibit 8. Many Storms Never Saw Landfall

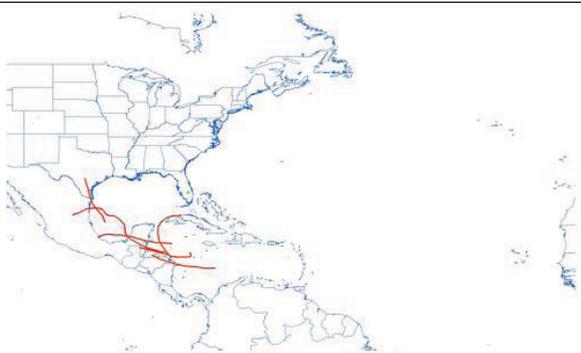


Source: Colorado State University

The remaining four storms formed and moved mostly in the Central part of the Caribbean

The other tropical storm pattern reflected storms that formed in the Western Caribbean and tracked either westward or northwestward. Six storms exhibited this pattern. The remaining four storms, including Tropical Storm Bonnie that crossed the Florida Peninsula, formed and moved mostly in the Central part of the Caribbean basin around Cuba.

Exhibit 9. Mexico Took Brunt Of Storms



Source: Colorado State University

This was the fewest named storms (previous low was eight in 1977) and the fewest hurricanes (previous low was four in 1969, 1970, 1977 and 2007) on record since the satellite era began in the mid-1960s

An interesting development in the tropical storm department, although having less significance for the U.S. oil and gas industry, was the impact La Niña had on storms in the North Pacific. It essentially suppressed the formation and strengthening of storms in the eastern portion of the North Pacific. That region generated seven named storms, of which three grew into hurricanes and two of those became intense hurricanes. This was the fewest named storms (previous low was eight in 1977) and the fewest hurricanes (previous low was four in 1969, 1970, 1977 and 2007) on record since the satellite era began in the mid-1960s. An average season for the eastern North Pacific is 15 named storms, nine hurricanes and four intense hurricanes.

Exhibit 10. Fewer Pacific Storms This Season



Source: NOAA

Dr. Gray at CSU has done extensive work on this issue and finds little or no relationship between global warming and CO² emissions on the number of storms and their intensity

Invariably the issue of the impact of global warming on the formation and intensity of tropical storms comes up. Dr. Gray at CSU has done extensive work on this issue and finds little or no relationship between global warming and CO² emissions on the number of storms and their intensity. Dr. Gray continues to update his research after each season. What he has found is that Atlantic basin storm activity is cyclical and highly dependent on the strength or weakness of the Atlantic thermohaline circulation (THC), which reflects multi-decadal variations. This variation is often referred to as the Atlantic Multi-decadal Oscillation (AMO). The strength or weakness of the THC or AMO cannot be measured directly. As it comes from the movement of warm and cool water throughout the Atlantic basin, its condition can be measured by studying changes in sea surface temperatures and the salinity of the water.

While there has been a dramatic increase in the number of intense hurricanes since 1995, which has given rise to people speculating that global warming is the cause, the data does not support that conclusion. For 1995-2010, there were 61 intense hurricanes, which was significantly greater than the 25 experienced during the prior 16-

In the immediately preceding 16-year period when Atlantic Ocean circulation conditions were similar to the most recent period, we experienced the same number (61) of intense hurricanes

year period of 1979-1994. However, in the immediately preceding 16-year period when Atlantic Ocean circulation conditions were similar to the most recent period, we experienced the same number (61) of intense hurricanes. Moreover, the amount of carbon emission has increased steadily over the entire 48-year period of 1962-2010. Over the time period 1962-1978, there was an average of 319 parts per million (ppm) of CO² in the atmosphere. The average CO² concentration increased to 345 ppm for 1979-1994 and further to 373 ppm for 1995-2010.

Exhibit 11. Data Doesn't Support Global Warming Fear

<i>YEARS</i>	<i>Named Storms</i>	<i>Hurricanes</i>	<i>Major Hurricanes (Cat 3-4-5)</i>	<i>Global Temperature Increase</i>
1901-1955 (55 years)	210	115	44	+0.4°C
1956-2010 (55 years)	180	87	34	

Source: Colorado State University

Given these facts, it is hard to argue that global warming has caused the increase in tropical storm activity or the intensity

Dr. Gray has traditionally shown the chart in Exhibit 11 that depicts the lower number of named storms, hurricanes and intense hurricanes for the 55-year period marking the first half of the 20th Century compared to the second half when CO² emissions and global temperatures were higher. Given these facts, it is hard to argue that global warming has caused the increase in tropical storm activity or the intensity, despite a recent statement on a Houston television morning show saying this was the case.

Drs. Klotzbach and Gray will release their early forecast for the 2011 hurricane season on Wednesday, December 8th. Even if there is a decline in the projected number of storms next year, we must always be prepared because it only takes one storm hitting in the "wrong" location to create severe damage and disruption of lives. Let's hope we continue 2010's string of storms avoiding the U.S. coastline.

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