
MUSINGS FROM THE OIL PATCH

July 19, 2011

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Managing Director

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

Gas Shale Debate Creates Strange Producer Economic Analysis

We believe there is plenty of room for a fair debate over gas shale data, facts and their interpretation without stooping to personal attacks

As we wrote in our last *Musings*, the debate over gas shale well profitability not only has gone mainstream, but it has quickly degenerated into character assassination yielding little of value from the discussion. As distressing as that is, we believe there is plenty of room for a fair debate over gas shale data, facts and their interpretation without stooping to personal attacks. We were somewhat surprised by the lack of credible intellectual arguments put forth recently by Dr. Terry Engelder a professor of geosciences at Pennsylvania State University.

As the Marcellus underlies areas of large population concentration, it has become the battleground over the use of hydraulic fracturing

Dr. Engelder heads a team at Penn State that developed the initial estimates of the massive Marcellus shale formation covering areas of Pennsylvania, New York, Ohio and West Virginia. It is one of the hottest gas shale plays in the country due to its extent and belief in its gas resource potential, but also because of its proximity to the huge, gas-hungry East Coast market. As the Marcellus underlies areas of large population concentration, it has become the battleground over the use of hydraulic fracturing to unlock the trapped gas. Environmental and anti-fossil fuel lobbies have teamed up to attack gas shale development as being unsafe for citizens.

The obtuse argument made by some industry critics is that if it didn't use hydraulic fracturing then the wells wouldn't produce so the opportunity for gas to seep into water wells wouldn't exist

The primary attack against gas shale development is that hydraulic fracturing can damage drinking water sources, although there are no documented cases of it happening. There are cases of poor well drilling practices having allowed produced gas to seep into nearby water wells, but this is not due to fracturing. The obtuse argument made by some industry critics is that if it didn't use hydraulic fracturing then wells wouldn't produce so the opportunity for gas to seep into water wells wouldn't exist. That's all well and good, but it doesn't help our energy supply picture. Under the Obama administration's convoluted thinking that requires everyone to buy

Dr. Engelder is on record demonstrating that hydraulic fracturing is not the cause of well problems in Pennsylvania

health insurance policies to spread health costs, they should be making landowners drill wells to keep natural gas prices down.

On the issue of water well poisoning, Dr. Engelder is on record demonstrating that hydraulic fracturing is not the cause of well problems in Pennsylvania. But Dr. Engelder has less credibility when he weighs in on the issue of gas shale well economics. In an article for *The Houston Chronicle* by Jennifer Dlouhy based on a conference call with Dr. Engelder sponsored by the American Petroleum Institute, he is quoted saying, "There's a disconnect between industry and their particular statements about what this business is — and it really is a long-term investment — and Berman's view that it has to pay off in a relatively short period of time."

If a similar cost well requires twice as long to pay out as another well, the longer payout well will generate a lower rate of return

Mr. Arthur Berman, a consulting geologist and long-standing critic of gas shale economics, has repeatedly stated in presentations that his clients demand relatively short payback periods. So when he evaluates gas shale prospects for his clients, usually independent oil and gas companies, he has to take into account the time required to pay out the wells' investment, which is a function of the wells' production and their cost to drill and complete, along with the present value of that money. If a similar cost well requires twice as long to pay out as another well, the longer payout well will generate a lower rate of return. For producers who prize higher returns, they value E&P projects with faster paybacks.

An article in *FirstBreak*, published by the European Association of Geoscientists & Engineers (EAGE), written by Rudd Weijermars, a professor in the department of geotechnology at Delft University of Technology, and Steve Watson, a professor at the Ashridge Business School, discussed the impact of technology deployment and rolling investment decisions for improving the performance of unconventional field development projects. In the article, the professors discussed the differences in economic decisions when developing conventional versus unconventional resources. We quote the two key paragraphs below.

"Cash flows of traditional or conventional gas projects invariably perform adequately and deliver high IRRs"

"In conventional gas projects, significant upfront investments are made to tap into the whole of the interconnected gas reservoir at once, applying a tailor-made and optimized field development strategy. The present value of conventional gas fields is continually maximized by applying a rigorous value assurance review (VAR) system, using pre-determined decision gate-stages as part of the company's auditable records. As a result of the established VAR process, cash flows of traditional or conventional gas projects invariably perform adequately and deliver high IRRs. In contrast, field development plans for unconventional gas operators are highly susceptible to economic pressures.

The traditional VAR process does not provide a guarantee for

“A fundamental handicap for unconventional gas development projects is that optimized well development and maximization of net present value are marred by much higher subsurface uncertainty”

An interesting side note is the amount of taxes paid by producers in a conventional well versus an unconventional well

profitable unconventional gas operations. A fundamental handicap for unconventional gas development projects is that optimized well development and maximization of net present value are marred by much higher subsurface uncertainty. There is no gas interconnectivity between wells in unconventional reservoirs and the lack of gas communication means appraisal well data give very limited information over the rest of the acreage under leasehold or licensed. High variations in reservoir quality cannot be excluded by initial appraisal wells. Sweet spots only emerge gradually and after considerable expenditure has been made while the drilling of new wells advances to cover the acreage acquired. The initial risk in new unconventional gas plays is therefore very large. Opting out also remains a hard decision throughout the field's development as that would mean deferred losses are moved closer to recognition.

At the heart of the argument is the difference in investment time horizons and the gas production curves of the wells that generate the returns producers count on when beginning projects. In the exhibits nearby, we show the plots of the two different well types – conventional and unconventional. From looking at the unconventional gas chart, the projected gas curve resembles a tight gas or coalbed gas well rather than a gas shale well, but the analysis is similar. An interesting side note is the amount of taxes paid by producers in a conventional well versus an unconventional well, which would seem to be important for federal, state and local governments desperate for revenues.

Exhibit 1. Conventional Prospects Earn Returns Quickly

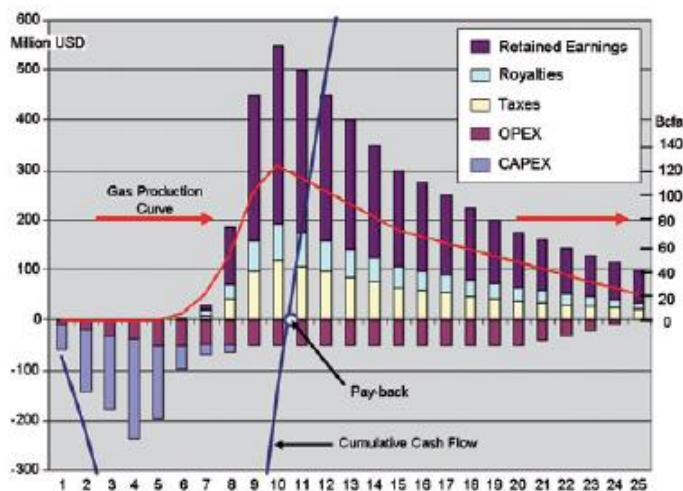


Figure 4 Conventional gas cash flow model, showing where retained earnings are generated. Production starts in year 6 of field development and EUR is 1.2 Tcf and NPV is \$2.3 billion, assuming a gas price of 5 \$/Mcf and discount rate is deliberately kept at 0%. Tax rate is 25% and royalty at 12%. Pay-back is after 10 years, but takes longer when discount rate is set (see Appendix for details)

Source: *FirstBreak*

Exhibit 2. Unconventional Breakeven Point Much Longer

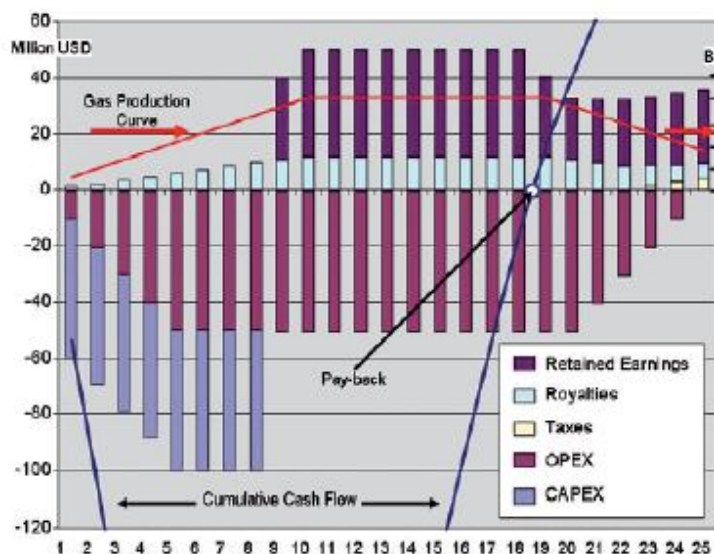


Figure 5 Unconventional cash flow model, showing annual retained earnings only kick in as soon as CAPEX is expended. Production starts in year 1 of field development, assuming wells of 0.2 bcfa at CAPEX of \$5 million each. EUR is 0.37 Tcf and NPV is \$160 million, assuming a gas price of 5 \$/Mcf and discount rate is deliberately kept at 0%. Tax rate is 25% and royalty at 12%. Pay-back is after 18 years, but takes longer when discount rate is set (see Appendix for details).

Source: *FirstBreak*

“The economic models that are being run by the major players in these gas shales recognize an eight- to 10-year payout”

In discussing the longer payout times for gas shale wells, Dr. Engelder was quoted by Ms. Dlouhy as saying, “The lifetime of gas wells...is considerably longer than a lot of the conventional wells, and so then there is going to be a fundamental shift in the way that industry deals with the economics of these gas shales.” He was referring to the longer payout times of unconventional wells. He was further quoted as saying, “The economic models that are being run by the major players in these gas shales recognize an eight- to 10-year payout.” What was obviously not said in the conference call is that the “major players” are engaged in portfolio management when they evaluate getting involved in gas shale developments.

Gas shale investments by companies such as Exxon Mobil Corp. (XOM-NYSE), who purchased XTO Energy for \$41 billion, and BHP Billiton (BHP-NYSE), who invested \$4.7 billion in the purchase of Fayetteville shale assets, were cited by one investment analyst as proof that they knew more about the profitability of this resource rather than a PNC Wealth Management analyst who questioned the flood of money coming into the gas shale industry that reminded him of the dot-com bubble. The major players moving into the gas shale business are confirming the existence of the resource and its long-term potential, but not necessarily its near-term profitability. A point we, and almost every critic of gas shale economics, acknowledge.

These low-profit gas shale investments are counted upon to become high-return assets at some point in the future and can help absorb low-return energy projects acquired in that future period

The big distinction in this debate is that these major investors have large and diversified portfolios of assets with a range of profitability from very low to very high. Under the portfolio management approach for oil and gas assets, these low-profit gas shale investments are counted upon to become high-return assets at some point in the future and can help absorb low-return energy projects acquired in that future period. Going from low-return to high-return assets necessitate a step change in oil and gas pricing and/or significant improvements in technology to extract the gas that reduces its cost meaningfully.

During the dot-com bubble of the late 1990s, we were the oil service stock analyst at Oppenheimer & Co. We often followed to the podium dot-com stock analyst colleagues who were recommending the shares of companies selling at nose-bleed valuations of their revenues per share. The companies had no earnings and little in the way of balance sheets. The stocks were valued on esoteric measures such as the number of 'eyeballs' viewing the company's web site and how that number would grow. We would draw a laugh from the brokers when we started our presentation by stating that our companies had 'real' revenues, earnings and balance sheets along with sound business strategies.

There were 289 Internet IPOs in 1999 raising a collective \$24.7 billion and the average one gained 90% in price in the first day of trading

In reviewing a history of the dot-com bubble, we were intrigued to see the fate of companies we recognized as having been recommended by our colleagues. Reading the timeline produced an interesting flashback. The dot-com boom began in 1990 when Al Gore, in an op-ed article in *The Washington Post*, introduced the phrase "superinformation highway" to the American public. Two years later, America Online was launched. The real craziness, however, didn't begin until the late 1990s. There were 289 Internet IPOs in 1999 raising a collective \$24.7 billion and the average one gained 90% in price in the first day of trading. In November 1999, e-tailer Boo.com was launched only to collapse the following May after going through \$135 million in shareholder money. The 2000 Super Bowl TV presentation exhibited more than 20 dot-com company ads at up to \$3 million each, including one by Pets.com that became the first U.S. listed dot-com to collapse ten months later. In March 2000, a group of dot-com companies including Freeserve, Psion, Thus and Baltimore Technologies were added to the FTSE 100 stock index in London only to be ejected three months later.

At the end of 1997, Amazon.com had an accumulated capital deficit of \$33.6 million

Buried in this history, however, was a gem that helps explain Wall Street's fascination with gas shale producer shares. In 1994 in the State of Washington, Amazon.com Inc. (AMZN-Nasdaq) was incorporated. In July 1995 its web site was launched. The company generated \$511,000 in revenue that year and lost \$301,000. The company completed its initial public offering in May 1997, raising a net \$49.7 million. That year the company generated revenues of \$147.8 million and lost \$27.6 million. At the end of 1997, it had an accumulated capital deficit of \$33.6 million.

“We will balance our focus on growth with emphasis on long-term profitability and capital management”

After launching Amazon.com in July 1995, it wasn't until January 2002 that the company reported its first quarterly profit

In his 1997 annual report letter to shareholders, Amazon.com CEO Jeffrey Bezos set forth his view of the company's strategy and business philosophy. He has attached that letter to subsequent shareholder letters. The Amazon.com philosophy was summed up in one key statement, “We believe that a fundamental measure of our success will be the shareholder value we create over the *long term*.” He went on to lay out a number of operating philosophies. These included, “We will continue to make investment decisions in light of long-term market leadership considerations rather than short-term profitability considerations or short-term Wall Street reactions.”

Two other guiding principles included, “When forced to choose between optimizing the appearance of our GAAP accounting and maximizing the present value of future cash flows, we'll take the cash flows.” And, “We will balance our focus on growth with emphasis on long-term profitability and capital management. At this stage, we choose to prioritize growth because we believe that scale is central to achieving the potential of our business model.”

Many of the gas shale producers are aggressively following the last half of that Amazon.com principle. What we worry about is that they haven't focused sufficiently on the other principles previously outlined. In 1997, Mr. Bezos said he wasn't as bold as to claim that this was “the ‘right’ investment strategy,” but as he said, “it's ours.” Shareholders had a long wait to see the proof of the company's strategy. After launching Amazon.com in July 1995, it wasn't until January 2002 that the company reported its first quarterly profit. Fortunately, Amazon.com was not a capital-intensive business. Had it been, it might not have been survived seven profitless years. Just how many years will it take for gas shale producers to demonstrate the validity of their strategies?

Al ‘An Inconvenient Truth’ Gore Returns To Climate Stage

Former vice president, Nobel Prize winner and now venture capitalist Al Gore announced he is starting a new climate activist program called the Climate Reality Project. The program will kick off with a live-streaming event called 24 Hours of Reality on September 14-15. It will be broadcast over 24 hours in 24 time zones and from numerous locations around the world.

The project used to be known as the Alliance for Climate Protection, but it has changed its name and its mission

The project used to be known as the Alliance for Climate Protection, but it has changed its name and its mission. According to a statement from Mr. Gore, “The climate crisis knows no political boundaries. Ferocious storms and deadly heat waves are occurring with alarming frequency all over the world. We are living with the reality of the climate crisis every day. The only question is; how soon can we act?”

The new project is an attempt to counter the belief that “fossil fuel

It was clear from both meteorologists who specialize in tornados and climate-change scientists that no tie between global warming and the number of tornados has been established

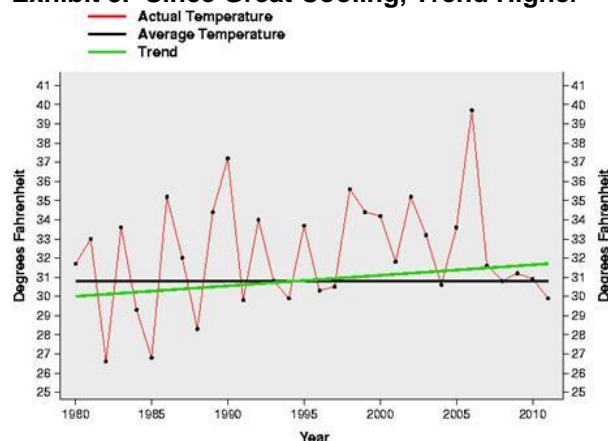
June's temperature data showed it was only the 26th warmest June out of 117 years of record keeping

companies and their allies will go to great lengths to deny the fact that climate change is happening now" said Maggie Fox, a long-time Gore advisor and climate activist who previously headed the Alliance. Based on the number of articles we have seen in the mainstream media about the rash of extreme weather events all being caused by global warming or climate change, it is evident they were designed to coincide with Mr. Gore's new campaign announcement.

The problem with this climate effort is that there is no scientific evidence to link these weather events with climate change. A recent peer-reviewed paper on hurricanes and climate change undercut the supposed link between global warming and increased tropical storm activity and intensity. When we examined the issue as it related to the rash of tornados this spring, it was clear from both meteorologists who specialize in tornados and climate-change scientists that no tie between global warming and the number of tornados has been established. In fact, until the sudden rash of tornadoes, storm activity in 2011 was below normal. Even after the storms, the year is on track to be just a normal year.

With all the media stories about the heat wave in the United States and the drought in the Southwest, we were surprised when June's temperature data showed it was only the 26th warmest June out of 117 years of record keeping. The heat wave focus has continued with more articles claiming that the heat was due to global warming caused by increased CO2 emissions from humans. So it was interesting to look at the temperature data for the contiguous 48 states published by the National Oceanic and Atmospheric Administration (NOAA). When we look at average annual temperature data between 1980 and 2011, we find that temperatures have risen, which NOAA calculates as rising by 0.54°F per decade. The change in temperatures is measured against the average temperature over 1901-2000.

Exhibit 3. Since Great Cooling, Trend Higher

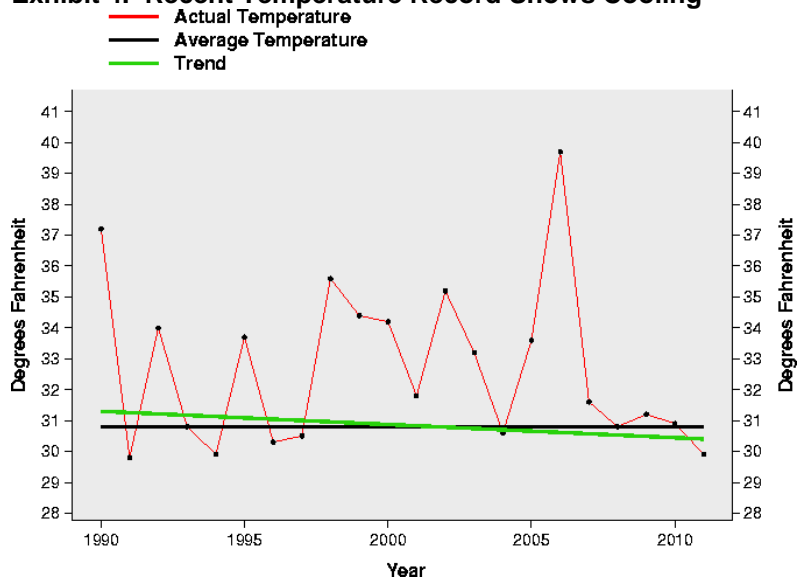


Source: NOAA, PPHB

It was in June 1974 that *Time* magazine wrote a story asking the question of whether the world was headed for another Ice Age

That temperature trend changes meaningfully when we pick the starting date of 1990, a decade later. Over 1990 to 2011, the trend in the average temperature is negative by 0.41°F per decade. The difference by selecting a later starting point highlights the difficulty in generalizing about temperature trends, let alone knowing the cause of these temperature trends. You may remember that it was in June 1974 that *Time* magazine wrote a story asking the question of whether the world was headed for another Ice Age. One paragraph from that article sounds much like the quandary today about global warming. *Time* wrote: "As they review the bizarre and unpredictable weather pattern of the past several years, a growing number of scientists are beginning to suspect that many seemingly contradictory meteorological fluctuations are actually part of a global climatic upheaval. However widely the weather varies from place to place and time to time, when meteorologists take an average of temperatures around the globe they find that the atmosphere has been growing gradually cooler for the past three decades. The trend shows no indication of reversing. Climatological Cassandras are becoming increasingly apprehensive, for the weather aberrations they are studying may be the harbinger of another ice age."

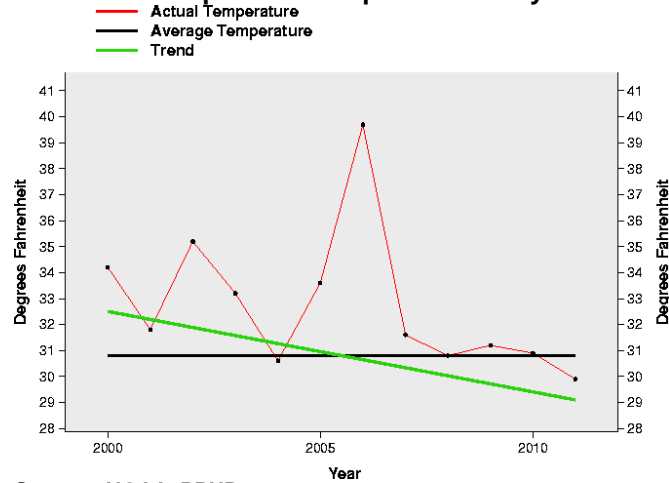
Exhibit 4. Recent Temperature Record Shows Cooling



Source: NOAA, PPHB

Based on average temperatures from 2000 to 2011, the trend has been down significantly

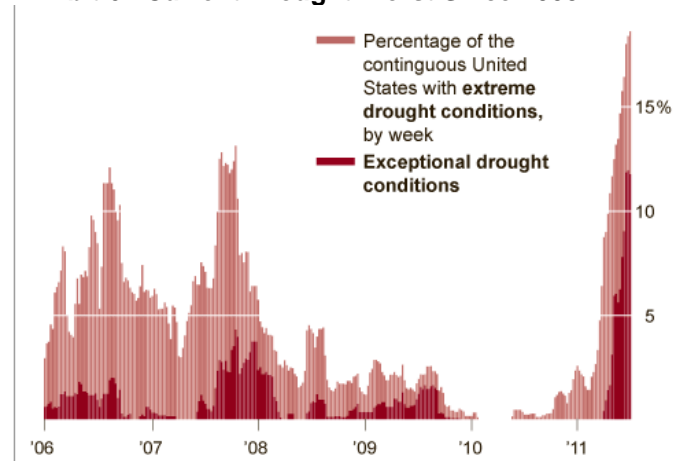
What has become a more challenging issue for the global warming supporters is the average temperature data over the past decade. Based on average temperatures from 2000 to 2011, the trend has been down significantly. Over that period, the average temperature has decline by 3.01°F per decade.

Exhibit 5. Temperature Drop Dramatically In Last Decade

Source: NOAA, PPHB

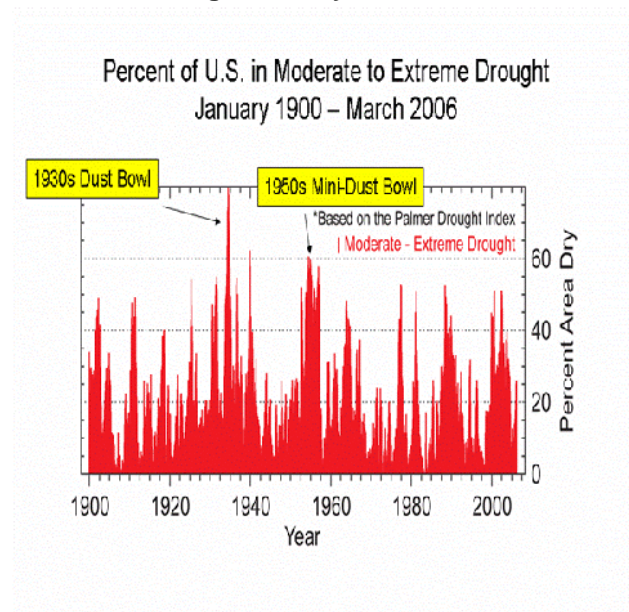
Al Gore and his friends will be beating on the drum of extreme weather trends being a manifestation of global warming despite temperatures not rising in concert with increased CO2 emissions

Our guess is Al Gore and his friends will be beating on the drum of extreme weather trends being a manifestation of global warming despite temperatures not rising in concert with increased CO2 emissions as projected by the climate models. A recent post by Joe Romm, a fellow at the Center for American Progress, who operates its web site *Climate Progress*, made the point that nearly 20% of the United States was subject to extreme and exceptional drought conditions, the highest it has been since 2005.

Exhibit 6. Current Drought Worst Since 2005Source: Joe Romm at *Climate Progress*

The 1930s era of the Dust Bowl and the 1950s Mini-Dust Bowl were considerably worse

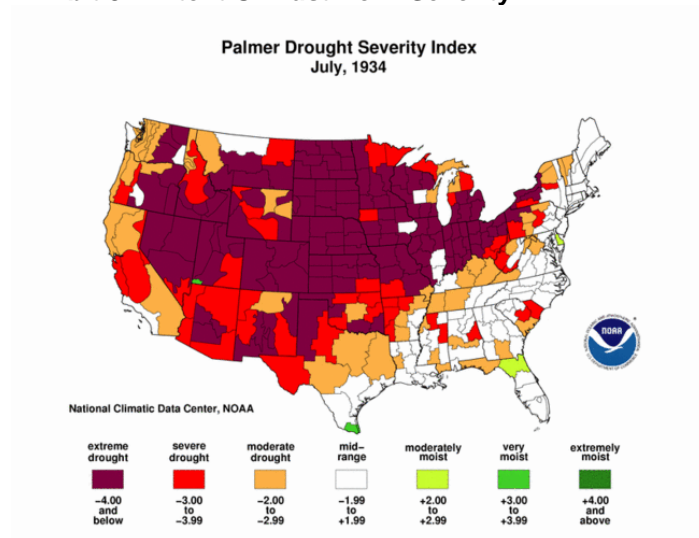
A chart based on data from the Commerce Department and used in a past research article shows that the current drought falls well short of past historical drought conditions. In particular, the 1930s era of the Dust Bowl and the 1950s Mini-Dust Bowl were considerably worse with 80% and 60%, respectively, of the nation's land impacted.

Exhibit 7. Drought History Worse Than Now

Source: Department of Commerce

A chart showing the detailed drought severity index by U.S. region for July 1934 demonstrates that the comparison is not overstated

Some bloggers questioned whether the rebuttal of Mr. Romm's posting by citing the Commerce Department chart overstates the latter's data. They point out that Mr. Romm's posting shows only extreme and exceptional drought conditions while the Commerce Department chart shows moderate to extreme conditions, in their view a greater range of damage. A chart showing the detailed drought severity index by U.S. region for July 1934 demonstrates that the comparison is not overstated.

Exhibit 8. Extent Of Dust Bowl Severity

Source: NOAA

Readers may want to steel themselves for an onslaught of pro and con articles about extreme weather and climate change

We suggest readers may want to steel themselves for an onslaught of pro and con articles about extreme weather and climate change for the next couple of months. The highpoint, or low-, depending upon your point of view, may coincide with Mr. Gore's 24-hour live-streaming show. By then, we should be in the height of the baseball playoff chase and hopefully starting the football season – certainly more entertaining events.

EPA Pollution Rules Drive Energy Market Transformation

The impact of the rule will be that utility companies are forced to upgrade their power plants, shift to burning coal that releases fewer pollutants and perhaps close some of their oldest and least efficient plants

Just over a week ago, the Environmental Protection Agency (EPA) unveiled its final Cross-State Air Pollution Rule designed to restrict greenhouse gas emissions in 27 states stretching from Texas and Minnesota on the west to all the states lining the East Coast. The rule will reduce pollution emissions from power plants that can be carried by the wind to neighboring states harming the health of their citizens. The impact of the rule will be that utility companies are forced to upgrade their power plants, shift to burning coal that releases fewer pollutants and perhaps close some of their oldest and least efficient plants. The EPA estimates that the utilities in these 27 states will need to spend \$800 million annually and invest \$1.6 billion per year in new capital investment in order to comply with the rule. These costs are being trumpeted as being “a jobs killing tax” for the utility industry.

Another beneficiary will be the global natural gas industry that will see greater demand for LNG

There is little doubt that the EPA rule will impact electricity markets as utilities are pushed to change their fuel mix. This shift comes at the same time the nuclear disaster in Japan has created a backlash over the safety of plants. This fear led Germany to reverse its energy policy from extending the lives of functioning nuclear power plants to accelerating their closure. The decision is starting to reverberate across Europe's energy supply markets. Further complicating the supply mix is the continuing unrest in North Africa and the Middle East and concerns about natural gas production growth from the North Sea. The net result is likely to be a stronger hand for Russia given its huge natural gas supplies and the expanding pipeline network into Europe. Another beneficiary will be the global natural gas industry that will see greater demand for liquefied natural gas (LNG). The prospect of growing LNG demand in Europe and Asia is behind the push to convert U.S. LNG receiving terminals into exporting facilities.

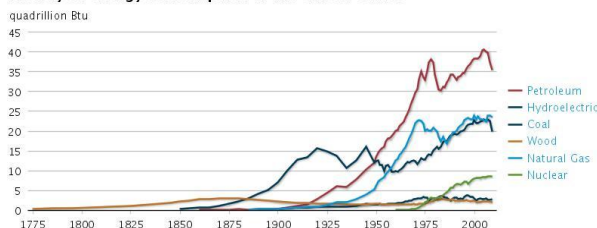
Existence of substantial infrastructure designed to support a particular fuel is a major reason why transitions from one fuel to another takes 30-50 years

The energy supply shift in the U.S. power market is further being driven by increased renewable fuel-use mandates by many states, and the sponsorship of alternative power sources, primarily wind and solar. Vaclav Smil, professor of Environment and Environmental Geography at the University of Manitoba, in his book [Energy Transitions: History, Requirements and Prospects](#), explains that the existence of substantial infrastructure designed to support a particular fuel is a major reason why transitions from one fuel to another takes 30-50 years. This phenomenon can be seen in the

chart of the history of U.S. energy consumption by fuel since 1635 for America prepared by the Energy Information Administration.

Exhibit 9. Energy Fuel Transitions Are Long

History of energy consumption in the United States



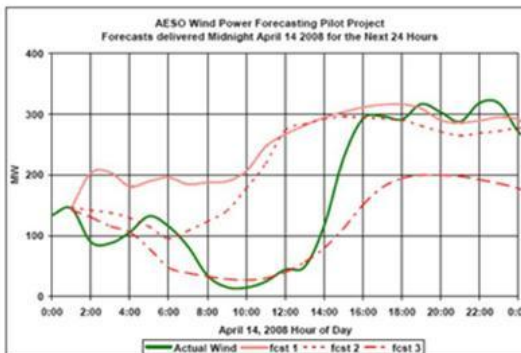
Source: EIA

At this point in time, wind and solar – the energy darlings of the Obama administration – don't even appear on this chart. That isn't because they haven't grown substantially, but rather that even with substantial investment incentives and mandates, these power sources are trapped in the transition phase identified by Professor Smil. This suggests that these fuels will not become major sources of energy supply until much closer to the middle of this century – forget them playing a major role within the next five to ten years as envisioned by President Obama.

The physical fact is that wind and solar are intermittent sources of electricity

While the government can mandate and support financially increased investment in wind and solar energy, we can't get away from the physical fact that these are intermittent sources of electricity and without significant technological breakthroughs in battery storage they will create power management headaches for the grid. The alternative power source that has established the largest market presence and momentum is wind. A solution to wind's intermittent nature is to build multiple wind farms in different areas so that the inconsistency in wind at one farm can be averaged out by greater output from neighboring wind farms.

Exhibit 10. Forecasting Wind Output Difficult



Source: NERC, Accommodating High Levels of Variable Generation, April, 2009

Source: INGAA

An emerging challenge for natural gas backup, however, is how to ensure adequate gas supply while being fairly compensated for providing this insurance

There is another challenge for dealing with wind variability, which is the use of backup fuel supplies necessitated by the public service requirement for electric utilities to deliver immediate and consistent power on demand. At the present time, the preferred, and presumably least costly, way to meet this requirement is to utilize natural gas-powered plants because they are more efficient in ramp-up/ramp-down situations than conventional fossil fuel-powered plants. An emerging challenge for natural gas backup, however, is how to ensure adequate gas supply while being fairly compensated for providing this insurance, which includes the cost to build and operate the necessary supply infrastructure.

A recent report prepared by ICF, an energy consulting firm, for the INGAA Foundation entitled Firming Renewable Electric Power Generators: Opportunities And Challenges For Natural Gas Pipelines, examines the challenges for the natural gas pipeline industry both on the supply side and the infrastructure requirements. For those not familiar with INGAA, it stands for the Interstate Natural Gas Association of America, an organization representing companies operating natural gas pipelines in this country. These are the companies that not only provide the natural gas transportation network, but will need to make investments to insure that future gas supplies will be where they are needed and when they will be needed.

Wind energy is variable and forecasting it over a 24-hour period can prove highly inaccurate

The report explores the economics of how the gas industry should deal with getting the gas supply and constructing the necessary pipeline infrastructure in order to meet the future mix of energy fuels for electricity generation in this country. Wind energy is variable and forecasting it over a 24-hour period can prove highly inaccurate. Due to this variability, there is a requirement for backup power that necessitates large and steep ramps up and down when wind supply changes. Natural gas planners face a challenge in how to accommodate these sharp ramps up and down. According to a case study in the report, wind variability in Wyoming and California resulted in alternative power plant ramps up and down that ranged between +173 megawatts per minute (MW/min) to -210 MW/min. The problem is that the cost of serving these backup generators, which may call on the gas pipeline system with little or no notice, will be much higher on a per unit cost basis.

About 5 billion cubic feet per day of incremental natural gas delivery capability could be required over that time span to fuel new gas-fired generation capacity as backup power supply

The ICF electricity model used in the study projects the industry building 105 gigawatts (GW) of electricity generation powered by renewable fuels over the next 15 years, and anticipates that 88 GW of that power will be fueled by intermittent wind. About 5 billion cubic feet per day of incremental natural gas delivery capability could be required over that time span to fuel new gas-fired generation capacity as backup power supply. The estimated total capital cost of this infrastructure for backup power supply could range from about \$2 billion to \$15 billion. The challenge of building this needed infrastructure is that its utilization could be quite low,

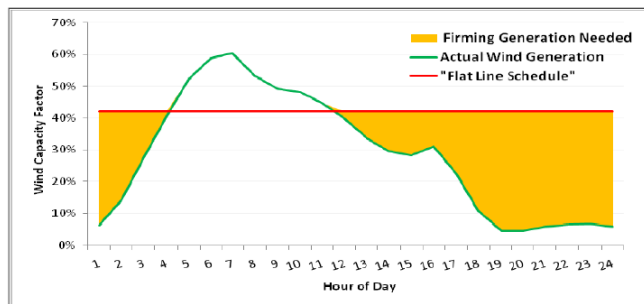
The study pointed out that as wind generating capacity has increased, electricity companies are now demanding hourly forecasts of power to be supplied one day ahead

around 15% or less. The implied cost of this new transportation capacity, at such a low utilization rate as 15%, would be over six times greater than the cost at a full utilization rate. Remember that the transportation cost for this backup gas supply is added to the cost of the supply.

There are two possible ways to insure power supply to deal with the variability of wind. The study pointed out that as wind generating capacity has increased, electricity companies are now demanding hourly forecasts of power to be supplied one day ahead. Wind suppliers can provide either a forecast projecting a constant amount of power per hour of the day or a continually varying power supply per hour. The next two charts show how that choice impacts demand for backup gas supply, assuming that gas-powered generation is the chosen backup power source. The constant amount chart, referred to as a "flat line schedule" shows when the gas supply will be needed, but it also points out the risk that substantial amounts of wind power could be shut down if wind proves much more prolific than forecast.

Exhibit 11. Steady Electricity Output Needs More Gas

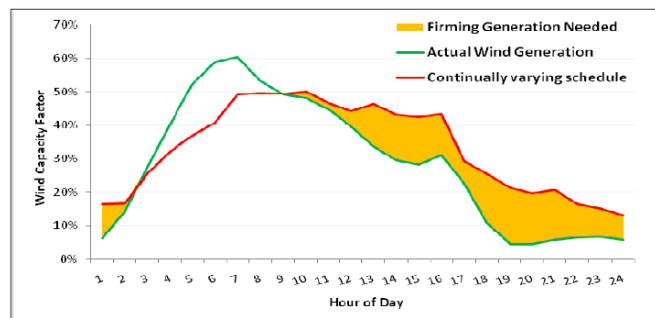
Exhibit 2-4: Firming to Create a "Flat Line" Schedule²



Source: INGAA

Exhibit 12. Matching Gas To Wind Minimizes Demand

Exhibit 2-5: Firming to Create a "Continually Varying" Schedule³



Source: INGAA

In the case of the continually varying power supply chart, there will be less gas supply required over the course of a full day, and the amount needed might even be less if wind power exceeds its

The cost estimate for incremental transportation capacity ranges from a low of \$2.1 billion to a high of \$14.9 billion

forecast. How the natural gas industry resolves this challenge remains to be seen, but clearly some decisions will need to be made. The decisions will be influenced by the amount of wind power generated in specific geographic regions and the existence of infrastructure. The report contained detailed analyses of each geographic region of the country and the results are contained in the table below. The cost estimate for incremental transportation capacity ranges from a low of \$2.1 billion to a high of \$14.9 billion. This study may be the first attempt to quantify the cost of the challenge of providing backup power supply for the growing wind generation capacity.

Exhibit 13. Cost Of Backup Gas Supply Could Be Expensive

Exhibit 5-1: Incremental Gas Transportation Capability Needed for Deliveries to Firming Plants, 2010–25

Region	Incremental Gas Power Plant Capacity for Firming (GW)	Incremental Transport Capability Required to Support Deliveries to Firming Plants (Bcfd)	Estimated Capital Costs for Incremental Transport Capability (Billion \$)		
			Low Assuming \$100/kW	Average Assuming \$400/kW	High Assuming \$700/kW
East North Central	2.6	0.6	0.3	1.0	1.8
East South Central	0.0	0.0	0.0	0.0	0.0
Mid-Atlantic	1.1	0.3	0.1	0.4	0.8
Mountain 1	3.9	0.9	0.4	1.6	2.8
Mountain 2	0.7	0.2	0.1	0.3	0.5
New England	0.8	0.2	0.1	0.3	0.6
Pacific 1	1.2	0.3	0.1	0.5	0.8
Pacific 2	1.3	0.3	0.1	0.5	0.9
South Atlantic	0.6	0.1	0.1	0.2	0.4
West North Central	3.3	0.8	0.3	1.3	2.3
West South Central	5.7	1.3	0.6	2.3	4.0
U.S. Lower-48	21.2	4.9	2.1	8.5	14.9

Source: INGAA

“The New York study found that 65 percent of the energy displaced by wind generation would come from natural gas, 15 percent from coal, 10 percent from oil, and 10 percent from imports”

The study concluded with a section reviewing the literature of other studies, most of which have been performed by power regulators. The study stated: “The California ISO study recommends adding more capacity with faster and more durable ramping capabilities to accommodate forecast errors and intra-hour wind variations. The New York study found that 65 percent of the energy displaced by wind generation would come from natural gas, 15 percent from coal, 10 percent from oil, and 10 percent from imports. The ERCOT [Texas] study showed that for every 1,000 MWh of wind generation, combined-cycle plant energy output drops approximately 800 MWh. Study findings such as these have significant implications on conventional generation performance and corresponding fuel usage, as a greater reliance on quick start units such as gas turbines could imply more volatile demand for natural gas.”

Therein lays one of the unintended consequences of integrating more wind and solar power into our electricity grid – greater variability in natural gas demand. This means increased investment

We continue to read in power market newsletters, more states and localities are fighting the construction of wind turbines in their communities

in gas storage and gas transmission facilities will be necessary – the cost of which is never discussed or maybe even considered during electricity rate-making hearings. This phenomenon helps explain why so much new natural gas powered electricity generation capacity has been constructed in recent years, but its utilization has not increased, and at times has declined. The idea that building multiple wind farms to smooth over the intermittent supply nature of this fuel sounds nice, but as we continue to read in power market newsletters, more states and localities are fighting the construction of wind turbines in their communities. The greening of the nation's electricity grid may prove more challenging and expensive than envisioned.

Gas Shales And Chesapeake's Bold Investment Move

The funds will come by shifting 1-2% of the company's exploration and production spending

Chesapeake Energy Corp. (CHK-NYSE) surprised the corporate world with an announcement that it plans to invest upwards of \$1 billion over the next 10 years in enterprises designed to boost the consumption of natural gas in this country. The funds will come by shifting 1-2% of the company's exploration and production spending. In the press release, Chesapeake announced its first two investments - \$150 million in newly issued convertible preferred debt of Clean Energy Fuels Corp. (CLNE-Nasdaq), a company involved in building the natural gas refueling infrastructure for heavy duty, over-the-road trucks, and \$155 million for a 50% ownership stake in private Sundrop Fuels, Inc., a cellulosic biofuels company working to build a refinery to make fuel from natural gas and waste cellulosic material.

This effort comes at a time when the push for subsidies boosting natural gas-powered vehicles is at risk due to the debt ceiling battle in Washington

With this effort, Chesapeake is hoping to jump-start the national effort to increase demand for natural gas as a transportation fuel. This effort comes at a time when the push for subsidies boosting natural gas-powered vehicles is at risk due to the debt ceiling battle in Washington. The Nat Gas Act, a bill designed to provide subsidies for the purchase of natural gas-powered trucks, has been pushed by Boone Pickens who has reportedly spent \$82 million to promote the legislation. Interestingly, there was no mention of Boone Pickens in the Chesapeake press release despite the fact he owns 40% of Clean Energy Fuels, which would be a major beneficiary if the Nat Gas Act were to be enacted.

There are certainly valid questions about whether investing in industrial enterprises is really part of the mandate of Chesapeake

To understand how much Chesapeake's effort is aimed at trying to change the political posture for natural gas as a transportation fuel, one only needs to read the first two sentences of the press release. Every patriotic rationale and buzzword supporting natural gas and its use as a transportation fuel is jammed into those two sentences. We almost wanted to stand up and salute Chesapeake CEO Aubrey McClendon. But there are certainly valid questions about whether investing in industrial enterprises, even though they are linked to the natural gas industry, is really part of the mandate of Chesapeake, or should be the focus of the company's business model.

The growth in gas production continues to be driven by the relentless pursuit of gas shale resources

The investment move comes at a time when natural gas prices are slightly higher due to the heat wave boosting consumption to fuel the air conditioning load. However, gas drilling continues strongly and gas production continues unabated. The growth in gas production continues to be driven by the relentless pursuit of gas shale resources. We remember a presentation by David Hager, Executive Vice President of Exploration & Production for Devon Energy Corp. (DVN-NYSE) at the AAPG annual meeting in Houston last April. In his presentation he focused on the strategic decision to reposition Devon in 2009 and focus on its unconventional North American resource portfolio. The company elected to sell its international assets and Gulf of Mexico properties to provide the funds necessary to exploit its unconventional asset portfolio in light of a lack of access to capital during the financial crisis.

In David Hager's view, "this messy period will end with blood in the streets"

During the presentation, Mr. Hager discussed many of the company's key assets and their potential and status. At the end, however, he commented on the state of the gas shale market. First, he said the shift to drilling for liquids-heavy shales was a stampede and as a result, drilling and completion costs were rising. Second, he focused on the impact of drilling with hedged cash flows versus real cash flows. Because of higher-priced gas obtained through hedges sold in prior years, many producers had more cash flow than they were actually generating from the sale of their current output. In his estimation, today dry gas drilling is sub-economic. He concluded with his observation that Wall Street was beginning to grow weary of funding undisciplined growth. In his view, "this messy period will end with blood in the streets."

Economy Struggles With Serious Issues – Energy Impact?

The employment figures suggest that economic activity in the second quarter will be lower than economists have been expecting

The latest weekly unemployment claims number showed a decline of 22,000 to 405,000 generating hurrahs and claims we are now on a trend toward better economic times. One small problem is that the prior week's unemployment claims were revised upward by 10,000 to 427,000. These unemployment claim numbers come after the dismal June employment report showing that the economy was only able to generate 18,000 net new jobs in the month and the unemployment up-ticked to 9.2%. The employment figures suggest that economic activity in the second quarter will be lower than economists have been expecting. From a growth estimate of 2% or slightly better, most forecasts are now calling for another sub-2% growth for the economy following the first quarter's 1.9% figure. Have we merely hit another economic soft patch, much as we did in the first half of last year, or do the economic statistics suggests a new, lower growth trend for the economy?

Our friend, Doug Leyendecker, writing in his Armchair Economics blog, posited a view that our economy structurally is in a transition from manufacturing-based to service-based and the government and regulatory policy tools are not well developed, if they even exist, to

The three sectors adding the greatest number of new jobs are health care, business services and leisure

manage this new economy. The transition is the result of a series of economic storms - technology, job outsourcing, the rural to urban shift and production as a percent of GDP falling - making it difficult if not impossible to return to our previous growth trend.

The figures on the number of jobs lost during the past two years by industry sector shows quite clearly how our economy has become service-oriented. The three sectors adding the greatest number of new jobs are health care, business services and leisure. They also happen to be three of the four largest employers in the private economy. The largest employer in the country – federal and state governments – is contracting and will likely continue to contract for some time.

Exhibit 14. Jobs Lost By Economic Sector

Category (Thousands)	Jobs Lost 6/09 - 6/11	Total Employed
<u>Goods Producing:</u>		
Construction	-490.0	5,513.0
Mining	100.0	786.0
Manufacturing	-21.0	11,707.0
<u>Services:</u>		
Retail	4.0	14,537.2
Wholesale	-36.0	5,543.5
Business Services	724.0	17,168.0
Transportation & Utilities	35.7	4,819.0
Finance	-141.0	7,611.0
Information	-109.0	2,686.0
Education	86.9	3,181.5
Health Care	662.1	16,741.4
Leisure	126.0	13,210.0
Other	75.0	5,449.0
<u>Government:</u>		
Federal & State Gov't.	-493.0	22,064.0
Total	523.7	131,016.6

Source: Wall Street Journal, PPHB

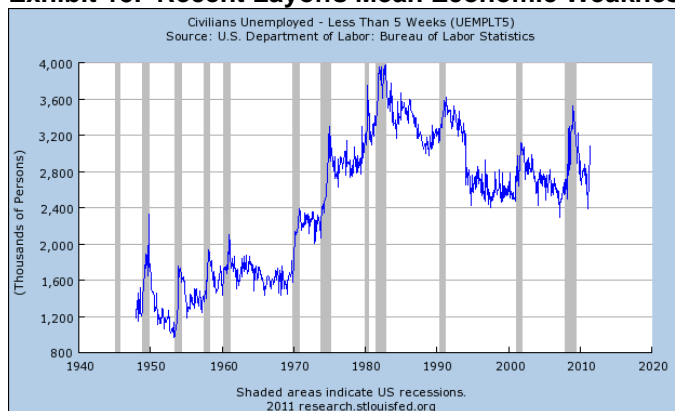
In a similar vein, *The Wall Street Journal's* Daniel Henninger wrote a column based on the Milliman Lecture at the University of Washington delivered this May by 1995 Nobel laureate and University of Chicago economics professor Robert Lucas. The professor argued that our government's policy actions are embracing the policies adopted by European countries in the 1960s

This means that employers have suddenly stepped up letting workers go

and 1970s that directed them onto a path of lower economic growth, higher unemployment, a larger government share of the economy, and now rebelling citizens fighting the implementation of austerity measures needed to support their countries' bleak economic outlooks.

The most distressing employment statistic out of the June employment report was the rise in recent layoffs. That is best shown by the data on the number of civilians unemployed less than five weeks. As shown in the chart below, the latest monthly employment report shows a sharp spike upward for this group, retracing nearly half its decline since the peak in 2009. This means that employers have suddenly stepped up letting workers go. That has to be seen as a reflection of a lack of confidence in employers' outlooks for their businesses in the near-term.

Exhibit 15. Recent Layoffs Mean Economic Weakness



Source: St. Louis Federal Reserve Bank

The question is just how long this slow growth period lasts

The employment data and current outlook for economic activity in this country suggest a continuation of slow economic growth. This means we will not see a significant upturn in energy demand any time soon. The question is just how long this slow growth period lasts. If Messrs Leyendecker and Lucas are right, we are firmly established on a long-term, slow growth economic trajectory, which is not positive for future energy demand.

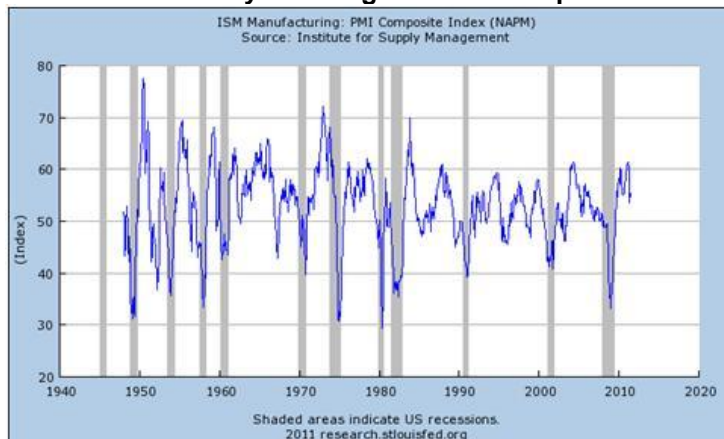
Divergent Views On Future Of Auto Industry

A week ago, U.S. Global Investors CEO and CIO Frank Holmes and the firm's director of research and portfolio manager, John Derrick, wrote an article in the firm's newsletter entitled "Don't Miss Your Chance to Catch a Bull Market." The article was an attempt to convince investors that conditions are ripe for another substantial rise in the U.S. stock market. The article focused on the growing amount of savings Americans are amassing and how negative investor outlook for the market has become. These conditions

The authors say the sound foundation of the U.S. economy is supported by manufacturing and service sector strength

would suggest a possible influx of money into the stock market, especially if it starts climbing in defiance of investor negativism. On a fundamental basis, the authors say the sound foundation of the U.S. economy is supported by manufacturing and service sector strength as measured by the Institute for Supply Management's Purchasing Managers Index (PMI) that remains above 50 signaling expansion.

Exhibit 16. Industry Showing Continued Expansion Trend



Source: St. Louis Federal Reserve Bank

Economic and stock market research firm ISI says this growth would likely raise America's GDP by 1%

Helping support their argument of strengthening U.S. manufacturing, the authors point to the auto industry, which they call "our trusty indicator of the global economy's fortitude." According to Mr. Holmes, the U.S auto industry is poised to rise by 16% in July over the prior month and overall third quarter sales should be up 86% quarter over quarter. Economic and stock market research firm ISI says this growth would likely raise America's GDP by 1%. Mr. Holmes also is relying on the uptrend in auto sales since late 2010. Unfortunately, this optimism isn't shared by one of the most knowledgeable and previously optimistic auto industry students, John Teahen, Jr., senior editor of *Automotive News*.

At the beginning of the year, the auto industry hoped for a 14 million unit sales figure, which then was reduced as second quarter sales results undercut the optimistic outlook

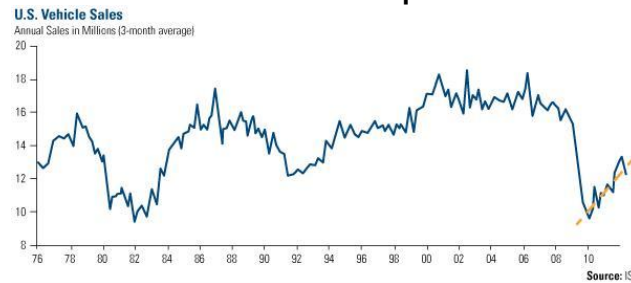
Mr. Teahen wrote a column saying that since we had passed the midpoint of the year, it was time to revise his forecast for 2011 industry sales. He called it his SWAG – scientific wild ass guess. For the decade 2001-2010, first half sales averaged 7,683,152 units. Full year sales for this period averaged 15,259,491 cars and trucks. First half sales accounted for 50.3% of full year sales. First half sales this year totaled 6,333,313, which if one applies the historic ratio, translates into a 2011 full year sales estimate of 12,578,579. Mr. Teahen said this number will disappoint most auto industry people. At the beginning of the year, the auto industry hoped for a 14 million unit sales figure, which then was reduced as second quarter sales results undercut the optimistic outlook.

While there still is a possibility 2011 could see 13 million cars and

At the end of six months, sales are only up 13% from last year

light trucks sold, the outlook is deteriorating. June's sales of 1,053,405 were up 7% compared to a year ago; they were lower than May's 1,061,841 sales. To demonstrate how things changed during the second quarter, after four months of this year, sales were 20% ahead of the same period in 2010. At the end of six months, sales are only up 13% from last year.

Exhibit 17. Auto Sales Show Uptrend But Pace Slowing

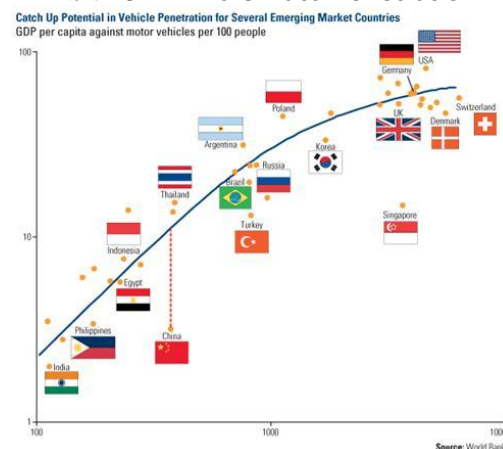


Source: U.S. Global Investors

China has 3.5 cars per 100 Chinese, which is low compared to vehicle ownership ratios in countries with similar GDP per capita such as Thailand

Mr. Holmes is also counting on auto sales, especially in China, to boost global economic activity. He authored a column in February in which he pointed out that auto research firm J.D. Power was forecasting global car ownership to rise 17% over the next five years. ISI was forecasting that Chinese auto sales would increase to 20.5 million units in 2011 from 2010's 18.5 million. ISI also expected Chinese annual auto sales to reach 30 million by 2015. Mr. Holmes pointed to two reasons for this dramatic auto sales growth. First, January auto sales in China rose despite the rollback in government subsidies. Also, passenger car sales drove the January results. ISI believed that double-digit per capita real income growth has created a "car culture" in China that will push up sales. At the present time, China has 3.5 cars per 100 Chinese, which is low compared to vehicle ownership ratios in countries with similar GDP per capita such as Thailand.

Exhibit 18. China's Auto Penetration Drives Demand



Source: U.S. Global Investors

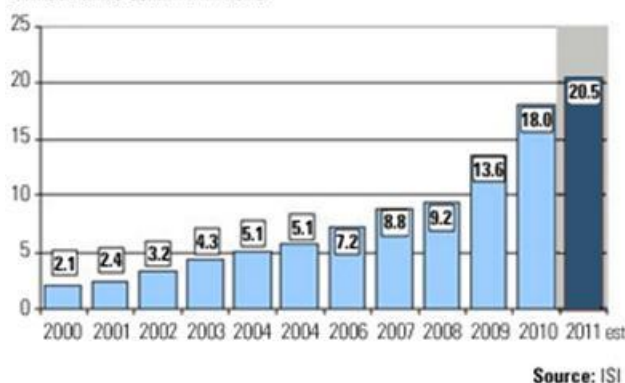
Through the first half, auto sales were up only 3.4% to 9.33 million units

The challenge to this optimistic outlook is the recent survey by the China Association of Automobile Manufacturers. The survey shows only a likely 5% growth in sales this year, down from earlier forecasts for 10%-15% growth. June auto sales of 1.44 million units were up 1.4% year over year. Passenger sales were up 6.2%, but commercial sales fell more than 10%. Through the first half, auto sales were up only 3.4% to 9.33 million units. The sales growth has been limited due to Beijing's phasing out incentives such as tax breaks for small-engine powered vehicles. Additionally, many cities such as Beijing have restricted the number of new cars that can enter the city. In an attempt to revive auto sales, the government is considering restoring incentives and is pushing cities to rollback limitations on the number of cars that can enter. Beijing has said it will not roll back its car restrictions.

Exhibit 19. Optimistic Sales Outlook Being Reduced

China Total Vehicle Sales

Annual units sold in millions



Source: U.S. Global Investors

Without a healthy automobile business, it is highly likely that energy demand growth will be less robust than expected

The global economic slow-patch suggests that many optimistic forecasts for economically-sensitive industries such as automobiles will be ratcheting down. As we have contended for years, without a healthy automobile business, it is highly likely that energy demand growth will be less robust than many forecasters expect.

Greening Economy Has To Pick More Vs. Less Green Cars

Auto manufacturers have been building and selling hybrid vehicles and now electric cars to meet these tougher environmental standards

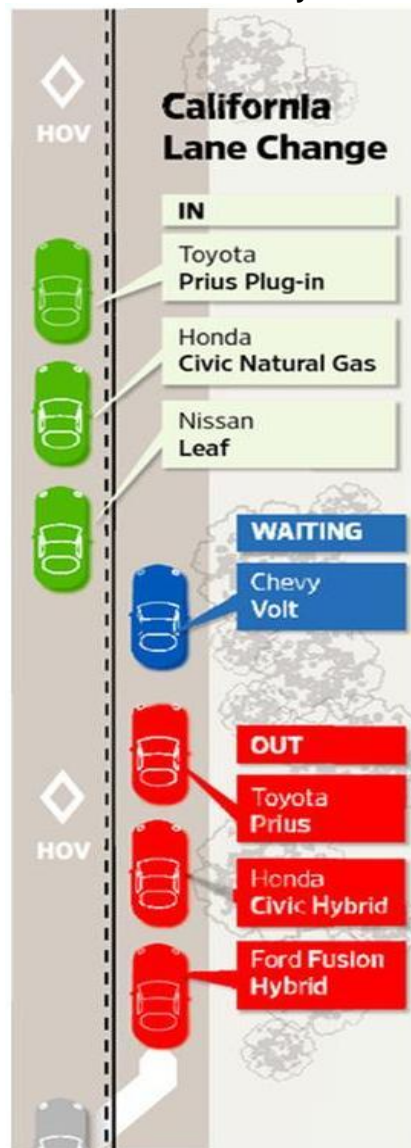
The State of California has been in the forefront of the green economy movement by mandating industrial policies that force auto companies and utilities to adopt green energy mandates sooner than later. Even though California has now agreed to match its emissions rules with those of the federal government, the state was ahead of national standards for autos for a long time. As a result, for many years in California auto manufacturers have been building and selling hybrid vehicles and now electric cars to meet these tougher environmental standards. One incentive the state offered drivers of lower emission vehicles was access to the state's

California has determined that conventional hybrid technology is so commonplace it no longer deserves special exceptions

high occupancy vehicle (HOV) lanes even when there were no passengers. This policy helped drive Toyota Motor Company (TM-NYSE) sales of hybrid Prius sales.

Suddenly, California has determined that conventional hybrid technology is so commonplace it no longer deserves special exceptions. Now, the state will only allow electric or plug-in vehicles along with natural gas powered cars to use HOV lanes. To the chagrin of General Motors (GM-NYSE), its Volt car that is powered by electricity but has an auxiliary gasoline engine won't be allowed in the HOV lanes, which will likely hurt their sales.

Exhibit 20. Common Hybrid Cars Penalized



Source: WAJ.com

Nissan has rolled out its EV Rescue Vehicle to help drivers who run out of battery charge

California's decision to allow the Leaf electric powered car was interesting since *Automotive News* reported last month that in its home province in Japan, Nissan (NSANY.PK) has rolled out its EV Rescue Vehicle to help drivers who run out of battery charge. The vehicle is a 5-ton diesel truck with a 29-kilowatt diesel-powered generator on the back. Between last summer and this April, the Japan Automobile Federation (equivalent to our AAA) has come to the rescue of broken-down electric vehicles 86 times, 73 of which were due to the driver draining his battery. The EV Rescue Vehicle delivers a 20-minute charge with just enough electricity to give a Leaf a 25-mile range. This is a free-of-charge service that currently runs through the end of December.

Exhibit 21. Nissan EV Rescue Vehicle At Work

Source: Google Images

On an amusing note, a Japanese auto writer who was test-driving the Leaf, ran out of battery charge and had to be towed to his office. We wonder what his review said.

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