

MUSINGS FROM THE OIL PATCH

March 15, 2011

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Managing Director

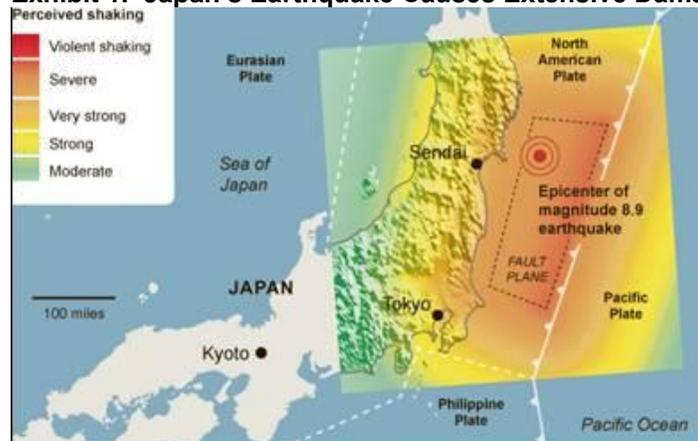
Note: *Musings from the Oil Patch* reflects an eclectic collection of stories and analyses dealing with issues and developments within the energy industry that I feel have potentially significant implications for executives operating and planning for the future. The newsletter is published every two weeks, but periodically events and travel may alter that schedule. As always, I welcome your comments and observations. Allen Brooks

Will Japan Become 2011's Energy Black Swan?

The 8.9 magnitude earthquake that hit Japan, Friday morning has caused extensive damage in the northwestern portion of the country

The 8.9 magnitude earthquake that hit about 80 miles east of Sendai, Honshu, Japan, Friday morning has caused extensive damage in the northwestern portion of the country and inflicted a large death toll on the island nation. The earthquake also unleashed a tsunami that landed along the Japanese coast line destroying everything in its way, and it also sent waves to Hawaii and the U.S. West Coast although there was no damage to those locations.

Exhibit 1. Japan's Earthquake Causes Extensive Damage



Source: *The New York Times*

Japan is the leading country in terms of seismic activity

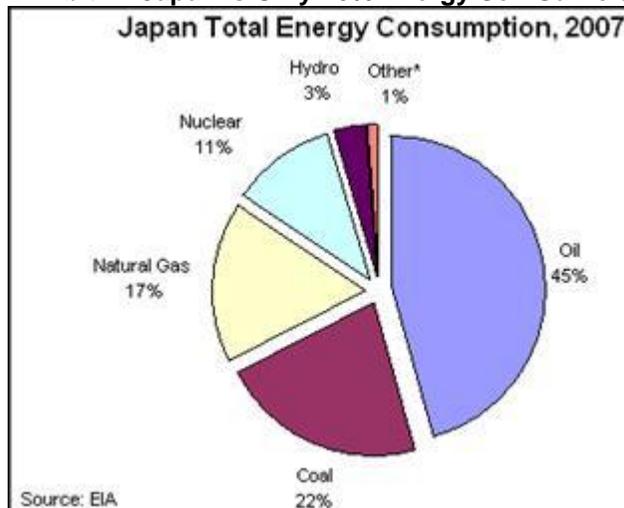
The country's infrastructure has suffered extensive damage even though Japan has probably the toughest building standards in the world for withstanding earthquakes. That is because Japan is the leading country in terms of seismic activity. This earthquake ranks as the world's fifth strongest since 1900 and the most powerful on record to hit Japan. The quake was 700 times more powerful that

At the present time 10 nuclear reactors have been taken offline

the January 2010 earthquake that hit Haiti and 8,000 times stronger than the one that devastated Christchurch, New Zealand, last month. The latest news is that the death toll in Japan may be in the tens of thousands as many bodies have been washed up following the tsunami. The Haiti earthquake claimed the lives of over 220,000 of its residents.

Damage to varying degrees is spread all throughout Japan ranging from about four million buildings in Tokyo being without power to a potential meltdown of the Tokyo Electric Power Company's nuclear power plant at Fukushima, which supposedly has melted. A second plant is having problems, too. Currently, 15 nuclear reactors are offline. Five refineries automatically shut down when they detected vibrations from the earthquake. Those refineries represent 1.2 million barrels per day of processing capacity, equal to about a quarter of Japan's refining capacity. Two of the five refineries have suffered damage. The damaged refineries are located at Sendai and Chiba, but the extent of their damage is not known yet.

Exhibit 2. Japan Is Only 16% Energy Self-Sufficient



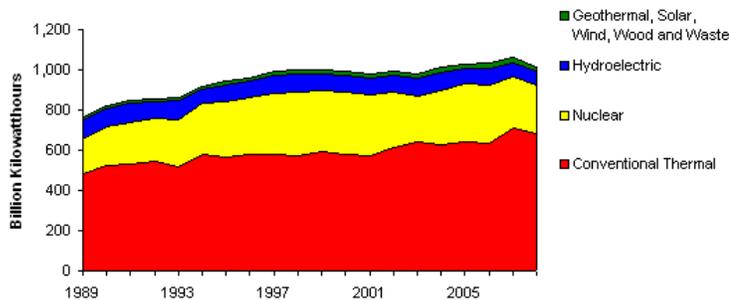
Japan is the world's largest importer of liquefied natural gas (LNG) with 6.32 million metric tons and of coal (214 million short tons)

Japan has few indigenous energy resources and is therefore only 16% self-sufficient in meeting its 22.5 quadrillion British thermal units of consumption in 2007. It is the third largest oil consumer behind the United States and China and the world's second largest net oil importer, bringing in 3.7 million barrels per day last year. Japan is the world's largest importer of liquefied natural gas (LNG) with 6.32 million metric tons and of coal (214 million short tons). As shown in Exhibit 2, oil provides 45% of the country's energy fuel needs with coal supplying 22%, natural gas 17% and nuclear power 11%. It is difficult at the moment to understand the impact this earthquake will have on Japan's energy consumption and its import needs. There will also be a question about the ability of Japan to increase its fuel

imports given the damage observed along the coast and in ports. While ships might be able to be diverted to other ports in the country, the ability to then move the fuel to power generating facilities may not exist.

Exhibit 3. Nuclear Is 24% Of Japan’s Electricity

Japan’s Electricity Generation by Source, 1989-2008



Source: Energy Information Administration

Source: EIA

If all these reactors remain offline, replacing their output with natural gas will necessitate increasing LNG imports by 1-1.2 billion cubic feet per day of natural gas

Japan’s electricity is fueled with 30% natural gas, 25% coal and 24% nuclear. Oil, hydroelectric and renewables make up the balance. At the present time, 10 of Japan’s 54 existing nuclear reactors have been shut down. It is estimated that if all these reactors remain offline, replacing their output with natural gas will necessitate increasing LNG imports by 1-1.2 billion cubic feet per day of natural gas. That may not be feasible so there will likely be an increase in the amount of oil that needs to be imported. That is in addition to the likely need to increase refined product imports with the possible loss of up to one-quarter of the nation’s refining capacity. The bigger question that cannot be answered at the present time is just how much of Japan’s economy will be shutdown and for how long. Answering that question will tell how much of Japan’s overall energy demand may be lost, which could act to loosen the tightening oil market that has driven oil prices higher due to the civil unrest in the Middle East and North Africa.

This may be the energy Black Swan this year forcing energy forecasters to have to revise their models

Middle East countries are crucial to Japan’s energy supply. In 2009, the country received 27% of its oil imports from Saudi Arabia, 9% from Kuwait, 12% from Qatar, 20% from the United Arab Emirates and 9% from Iran. Japan gets only 3% of its imported oil from Russia, while the rest of the world accounts for 20% of its imports. There is a similar heavy reliance on Middle Eastern countries for LNG with Qatar accounting for 12% and the UAE 7.9%. Southeast Asia is a more important LNG supplier as Australia accounts for 18.5% of Japan’s imports while Brunei, Indonesia and Malaysia collectively represent 49% of the country’s total imports. The impact of the Japanese earthquake on global energy markets cannot be determined today, but it will become clearer as the weeks go on. This may be the energy Black Swan this year forcing energy forecasters to have to revise their models.

Does Lack Of Sunspots Signal New Little Ice Age Start?

The satellite failures come at a time when scientists, trying to understand climate change, are struggling to shift from computer models to forecasting systems employing actual scientific data measurements

On March 4th, a rocket carrying the National Aeronautical and Space Administration's (NASA) Glory global warming monitoring satellite lifted off from the Vandenberg Air Force Base in California and plunged in the Pacific Ocean minutes later. This \$424 million failure was the second global warming satellite lost in two years, the other failure having occurred in 2009. Given the Obama administration's efforts to cut back NASA's spending and Republican budget cutting efforts, the outlook for more money for additional global warming satellites in the near future does not look bright. All is not lost, however, as NASA currently has 13 global warming satellites aloft, although scientists contend that 12 of them are reaching the end of their effective operating lives. The satellite failures come at a time when scientists, trying to understand climate change, are struggling to shift from computer models to forecasting systems employing actual scientific data measurements.

It would be a good thing if climate change scientists worked with more and better meteorological data. The failure to use real data is only one aspect of faulty computer models. Not understanding the forces driving the data measurements is a greater failure. When it comes to forecasting future sunspot activity, which has been observed and chronicled since the 1600s, the recent failure of computer models to accurately predict the next sunspot cycle suggests maybe other factors need to be considered. Unfortunately, these other factors might force climate change scientists to have to radically revise their assumptions about the cause of global warming.

“Our model has demonstrated the necessary skill to be used as a forecasting tool”

In 2006, with great fanfare, a team of scientists from the National Center for Atmospheric Research (NCAR) announced development of a new forecasting model for predicting sunspot cycles. According to NCAR scientist Mausumi Dikpati, the leader of the forecast team at NCAR's High Altitude Observatory, “Our model has demonstrated the necessary skill to be used as a forecasting tool.”

The model had simulated the strength of the past eight solar cycles with more than 98% accuracy

The forecast team predicted that the next sunspot cycle (Solar Cycle 24) would be 30-50% stronger than the last one and begin as much as a year late. The forecast came from the new model. The scientists had a high confidence level in the forecast since the model had simulated the strength of the past eight solar cycles with more than 98% accuracy. The model was developed from data tracking the subsurface movements of the sunspot remnants of the previous two solar cycles.

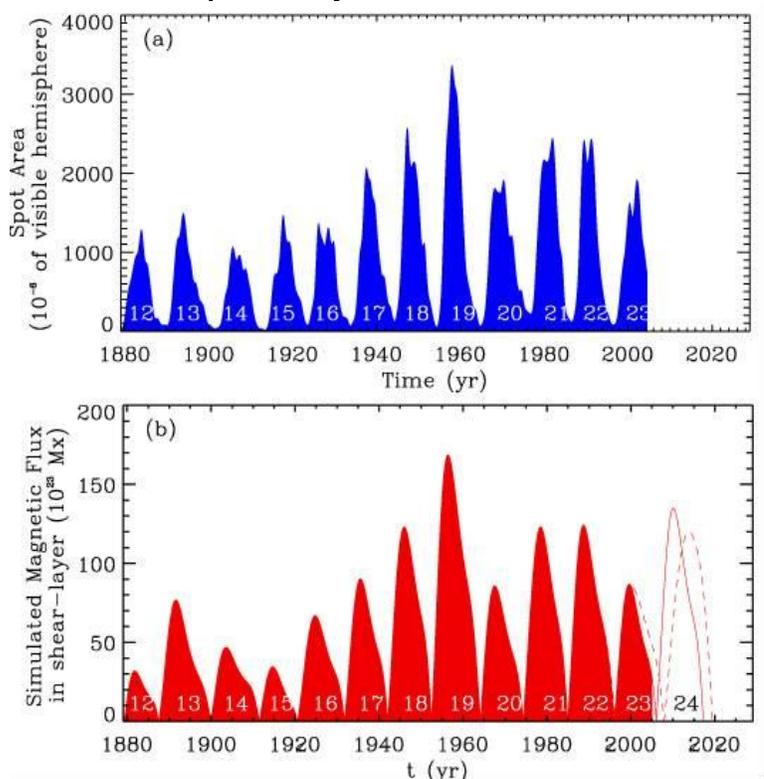
By being able to forecast sunspot cycles, the scientists believe it may be possible to help society anticipate solar storms that can disrupt communications and power systems and affect the orbits of satellites. These solar storms have a history of causing problems with both communications and power generation.

This eventually causes coiled-up magnetic field lines to rise up, tear through the sun’s surface and create new sunspots

The sunspot process begins with tightly concentrated magnetic field lines in the outermost layer of the sun’s interior. The field lines rise to the surface at low latitudes and form bipolar sunspots, which are regions of concentrated magnetic fields. When these sunspots decay, they imprint the moving plasma with a type of magnetic signature. As the plasma nears the poles of the sun, it sinks about 124,000 miles back into the convection zone and starts returning toward the equator at a speed of about three feet per second or slower. The increasingly concentrated fields become stretched and twisted by the internal rotation of the sun as they near the equator, gradually becoming less stable than the surrounding plasma. This eventually causes coiled-up magnetic field lines to rise up, tear through the sun’s surface and create new sunspots. This rotational pattern is similar to the temperature oscillation in the Atlantic basin that is largely responsible for the formation of hurricanes.

New satellite measurement techniques have enabled scientists to measure this solar phenomenon much like a doctor using ultrasound can tell a lot about the internal workings of humans. Using this technology, the NCAR scientists developed their model that had extremely high backcasting results. Given the historical performance of the model, the NCAR scientists then generated their forecast.

Exhibit 4. Sunspot History And Forecast Model Results



Source: NCAR

The confidence of the scientists was so strong that they said their goal was to be able to forecast two solar cycles, or sunspot activity 22 years into the future

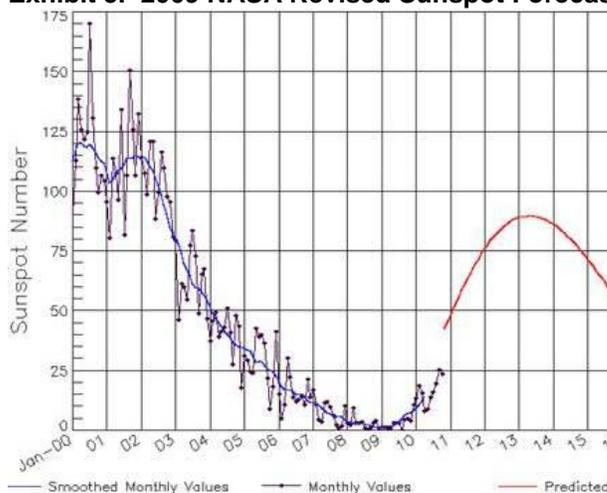
“Even a below-average cycle is capable of producing severe space weather”

As shown in Exhibit 4, the top graph shows the actual sunspot cycles since 1880. The graph below shows the model's forecast of historical sunspot cycles that proved 98% accurate. The solid red line in the chart shows what the model predicted – both with respect to the cycle's timing and strength. Because of data the scientists uncovered, they anticipated the start of Solar Cycle 24 to be six to 12 months later than the model predicted (late 2007 or early 2008) and not nearly as strong, although on a par with solar cycles 18, 21 and 22, and peaking in 2012. The confidence of the scientists was so strong that they said their goal was to be able to forecast two solar cycles, or sunspot activity 22 years into the future. They planned to issue a forecast in 2007 for Solar Cycle 25, which will peak in the early 2020s.

The NCAR forecast number for the peak in sunspot activity was about 130. The problem was that the sun failed to co-operate. In early 2009, NASA issued a revised sunspot forecast saying that Solar Cycle 24 would have a below-average number of sunspots. They predicted the peak sunspot number would be 90, the lowest of any cycle since 1928 when Solar Cycle 16 peaked at 78. NASA scientists were careful to not say that the current cycle was “weak” or “mild” as they believed it would give the wrong impression. “Even a below-average cycle is capable of producing severe space weather,” said Doug Biesecker of the National Oceanic and Atmospheric Administration’s (NOAA) Space Weather Prediction Center.

The 1859 storm, known as the “Carrington Event” after astronomer Richard Carrington who witnessed the instigating solar flare, electrified transmission cables, set fires in telegraph offices and produced Northern Lights so bright that people could read newspapers by their red and green glow. A report by the National

Exhibit 5. 2009 NASA Revised Sunspot Forecast



Source: NASA

In 2008 and 2009, the sun set Space Age records for low sunspots, weak solar winds and low solar irradiance

Academy of Sciences found that if a similar storm occurred today, it could cause \$1 to \$2 trillion in damages to the planet's high-tech infrastructure and require four to ten years for complete recovery. Hurricane Katrina, which devastated the U.S. Gulf Coast and New Orleans, caused "only" \$80 to \$125 billion in damage.

The 2009 revised sunspot forecast was caused by the altered behavior of the Sun. As Dean Pesnell of the Goddard Space Flight Center put it, "The sun in behaving in an unexpected and very interesting way." The solar cycle is in a valley, the deepest of the past century. In 2008 and 2009, the sun set Space Age records for low sunspots, weak solar winds and low solar irradiance. "In our professional careers, we've never seen anything quite like it," said Mr. Pesnell. "Solar minimum has lasted far beyond the date we predicted in 2007." The lack of sunspots suggests that something profound is happening within the Sun.

The sunspot forecasters have been struggling to understand what is happening as all their forecasts are proving wrong. The lack of sunspots in 2007 was explained, but then 2008 turned out to be calmer than expected. The sun was spot-free that year 73% of the time, an extreme dip even for a solar minimum. Only the minimum of 1913 was more pronounced with an 85% clear record.

Judith Lean of the Naval Research Laboratory published a study showing that high solar activity has a disproportionate warming influence on northern Europe

According to David Hathaway, a physicist at NASA's Marshall Space Flight Center, the findings have thrown the best computer models of the sun into disarray. Not only is it challenging the understanding of the sun, but it has an impact on our climate, which is highly controversial. In 2008, Judith Lean of the Naval Research Laboratory published a study showing that high solar activity has a disproportionate warming influence on northern Europe. Another researcher, Mike Lockwood of the University of Reading, UK, found that the severe European winters are much more likely during periods of low solar activity. Scientists believe that this fits a pattern of solar activity having a small impact on global climate overall, but large impacts on regional climates.

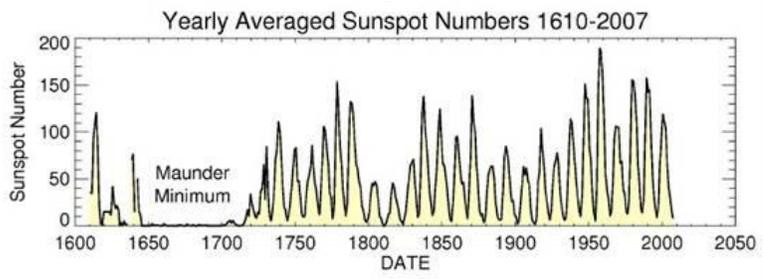
Mr. Lockwood's study shows that when solar activity is low, the jet stream becomes liable to break up into giant meanders that block warm westerly winds from reaching Europe, allowing Arctic winds from Siberia to dominate Europe's weather. Because there are so many weather stations in Europe, the global average could be skewed by not taking into account the solar impact on temperatures in the region.

What recent research has shown, however, is that the sun's energy output is changing. Since NASA's SOHO satellite was launched 15 years ago, it has watched two solar minimums, one complete solar cycle and parts of two other cycles. Its instruments have been able to measure the total solar irradiance (TSI), or the energy emitted by the sun. Along with other mission measurements, a 30-year period

This may mean that the sun is shrinking

of data can be stitched together. The data shows that in this latest solar minimum, the sun's output was 0.015% lower than during the previous minimum. This may mean that the sun is shrinking. There is other scientific data showing that the sun is losing its ability to produce sunspots. By 2015, they could be gone altogether, plunging us into another Maunder Minimum, or even a new Little Ice Age.

Exhibit 6. Another Little Ice Age In Our Future?

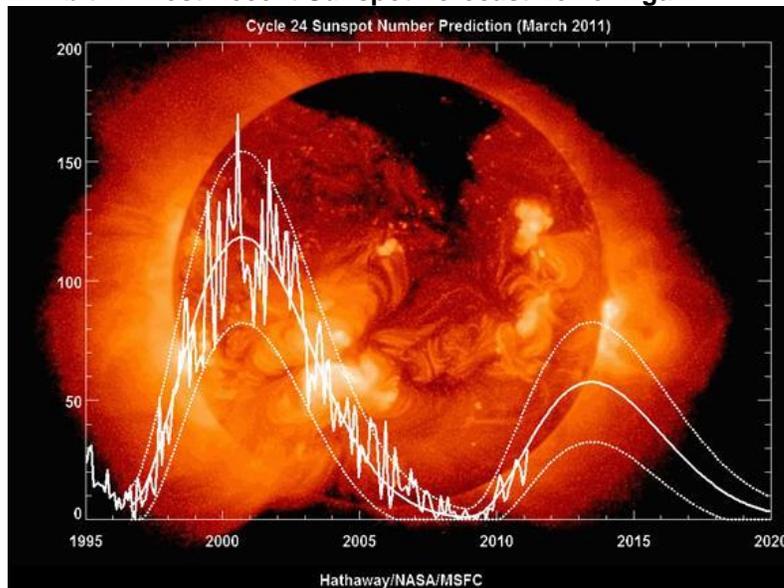


Source: *Solar Cycle 25*

On two occasions, sunspots all but disappeared for decades

What's the latest data on the absence of sunspots and their possible return? Mr. Lockwood has examined historical data for similar periods of solar inactivity. These periods produce certain isotopes in ice cores and trees. He found 24 such instances in the last few thousand years. On two occasions, sunspots all but disappeared for decades. At the present time, Mr. Lockwood puts the chance of this happening now at just 8%. In only one instance did the sunspot number bounce back to a record level. In the majority of cases, the sun continued to produce spots at significantly depressed levels.

Exhibit 7. Most Recent Sunspot Forecast Lower Again

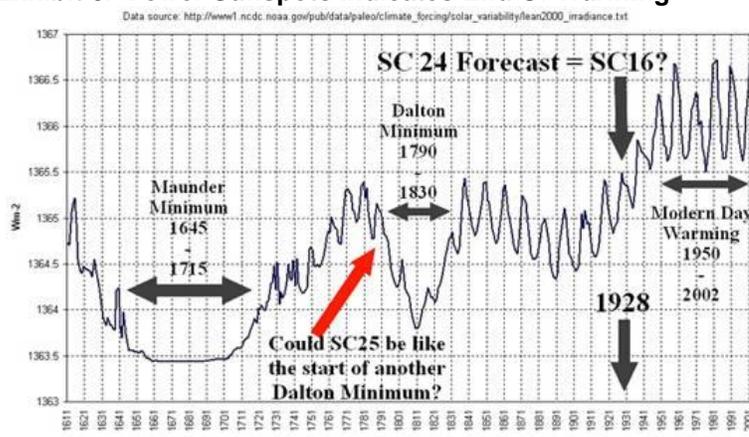


Source: NASA

The real key is that low sunspots signal that we have ended the modern day warming period of 1950-2002

The latest Solar Cycle 24 prediction now calls for the peak number to be 58 in July 2013. The real key is that low sunspots signal that we have ended the modern day warming period of 1950-2002. The debate will be whether sunspot activity, which was extremely high for an extended period, was the cause of global warming and not carbon emissions generated by humans.

Exhibit 8. Fewer Sunspots Indicates End Of Warming



Source: *Solar Cycle 25*

While the loss of the NASA satellite may hurt the climate research somewhat, quite possibly we already have access to the more proper scientific data to predict future global temperatures. Don't bet that "The debate is over" is over.

Environmentalist Victory In Eastern Canada Gas Shale Play

A four commissioner panel delivered a report recommending that the provincial government should conduct a strategic environmental evaluation of gas shale drilling

Last Tuesday, gas shale explorers in Canada's Quebec province were dealt a harsh blow when a four commissioner panel delivered a 323-page report to the Bureau d'audiences publique sur l'environnement (BAPE) recommending that the provincial government should conduct a strategic environmental evaluation of gas shale drilling. The committee has spent the past six months looking into the gas industry and the drilling and completion of gas shale wells. The focus of the study was on the potential environmental risk from the drilling of gas wells in the Utica formation and using hydraulic fracturing to complete them. The Utica formation, with its potentially large gas shale resources, lies in an area south of the St. Lawrence River between Montreal and Quebec City.

The government moved to freeze further exploration and the use of hydraulic fracturing technology

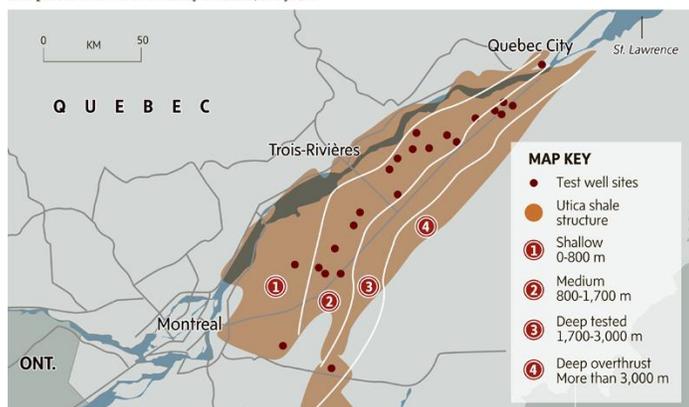
Shortly after the study was delivered, the government moved to freeze further exploration and the use of hydraulic fracturing technology to complete horizontally drilled wells until the full study of the environmental effects is completed. The study would be similar in scope to that conducted last fall on drilling in the lower St. Lawrence River that led to a ban. The study to be conducted will be

One estimate is that this gas shale study will require 30 months to be performed

overseen by an expert committee and can take from one to two years to complete. One estimate is that this gas shale study will require 30 months to be performed, suggesting an extended drilling hiatus, which is sufficient time to cause explorers to move on to other more promising opportunities.

Exhibit 9. Gas Shale Deposits In Quebec Promising Utica shale

The Quebec government estimates that there are 40 billion cubic feet of shale gas, enough to supply all of Quebec's energy needs for 200 years, in the so-called Utica geological structure. Industry says it has invested \$200-million in shale gas work in Quebec to date and predicts it will eventually create 6,100 jobs.



THE GLOBE AND MAIL. SOURCES: QUEBEC GOVERNMENT; QUESTERRE ENERGY CORP.

Source: *The Globe and Mail*

While the media has made a campaign out of assaulting the natural gas industry over hydraulically fractured gas wells, there is as yet no proven cases of any wells having been fractured that have resulted in pollution of groundwater

So far, there have been 29 wells drilled in the area and 18 of them have been hydraulically fractured. Environmentalists, community groups and concerned residents have raised an outcry over the gas shale projects. They claim that there are many documented cases in the U.S. and elsewhere that hydraulic fracturing can result in contaminated groundwater, air pollution and other problems. While the media has made a campaign out of assaulting the natural gas industry over hydraulically fractured gas wells, there is as yet no proven cases of any wells having been fractured that have resulted in pollution of groundwater. There are numerous examples of shallow natural gas formations that have interacted with groundwater zones resulting in water that can be set on fire. These cases are usually caused by poor cement jobs on the well casing that has allowed flowing gas to leak out of the well bore and into shallow groundwater formations.

The Association quebecoise de lutte contre la pollution atmosphérique, one of the environmental groups lobbying against gas shale development in the province, said it expects that the BAPE report will ultimately call for a moratorium on drilling of gas shale wells. The commission that delivered its findings basically said that after six months of study there was not enough information available to make educated decisions about the development of the gas shale industry in Quebec. Therefore, it advocated the longer study. Clearly the environmental movement feels it can create

enough fear about the hydraulic fracturing process that without proof of fractured wells creating groundwater pollution, the Quebec government will be reluctant to rule in favor of the industry.

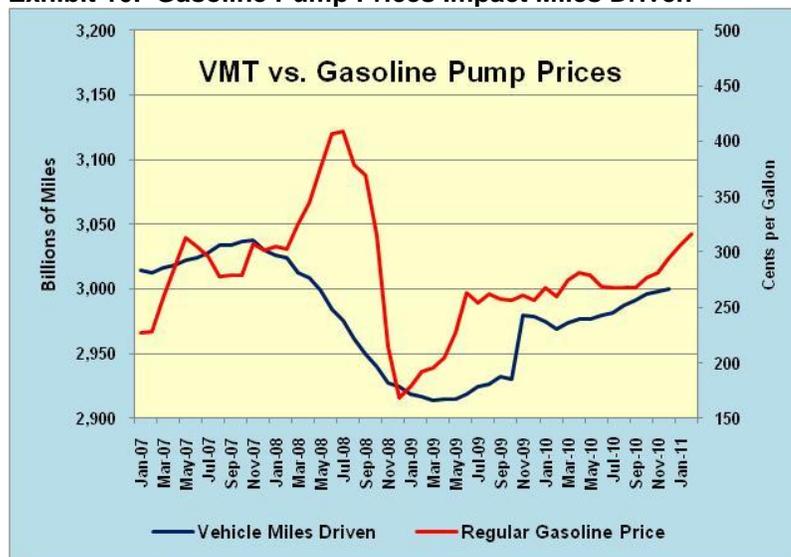
This move by Quebec to freeze all gas shale drilling and hydraulic fracturing of gas wells, unless done in pursuit of scientific research data, is another example of what separates Canada’s western provinces from its eastern cousins.

Gasoline Pump Prices Creating Political Problems

Americans drove three trillion miles last year, up 0.7% from the prior year

According to the latest statistics on driving, Americans increased their vehicle use in 2010 for the second consecutive year. Americans drove three trillion miles last year, up 0.7% from the prior year, but down from the 12-month moving total peak of 3.038 million miles at November 2007 shortly before the financial crisis erupted and gasoline prices began their climb towards \$4 per gallon in mid 2008. Exhibit 10 shows a graph of the 12-month moving total of vehicle miles driven versus gasoline pump prices. What is clear from the chart is that when gasoline prices hit \$3 per gallon, the increase in miles driven flattened out. By the time gasoline prices had begun to move higher, driving was in a downturn that wasn’t stopped until after the collapse in oil and gasoline prices in the second half of 2008.

Exhibit 10. Gasoline Pump Prices Impact Miles Driven



Source: DOT, EIA, PPHB

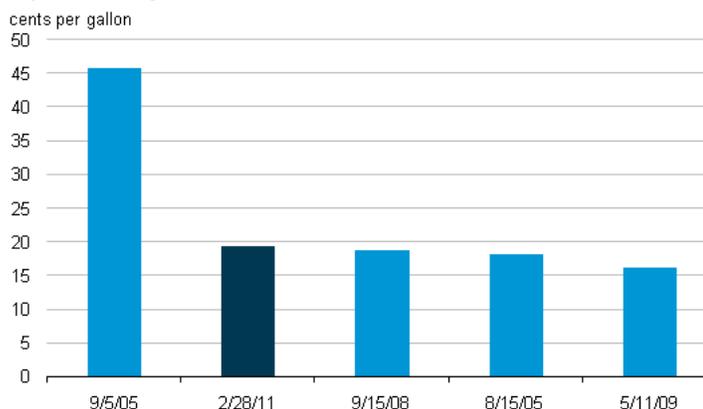
Crude oil prices have been climbing sharply in response to the civil unrest in the Middle East. Because the oil market fears the impact from a loss of Libyan oil production, which is light and sulfur free and can produce a high percentage of gasoline, it has driven up the price

The gasoline price increase for the week beginning February 28th marked the second greatest since 1990

it will pay for whatever Libyan oil is available along with the price of close substitutes. As oil prices have ratcheted higher, so too have gasoline prices. Because of current market dynamics, oil prices are experiencing one of its most explosive price increases in recent years. In fact, according to the Energy Information Administration (EIA) the gasoline price increase for the week beginning February 28th marked the second greatest since 1990. And that's before the price rise experienced in the latest week.

Exhibit 11. Periods of Strong Gasoline Price Hikes

Top Five Weekly Retail Gasoline Price Increases Since 1990



Source: U.S. Energy Information Administration - Gasoline and Diesel Fuel Update

Source: EIA

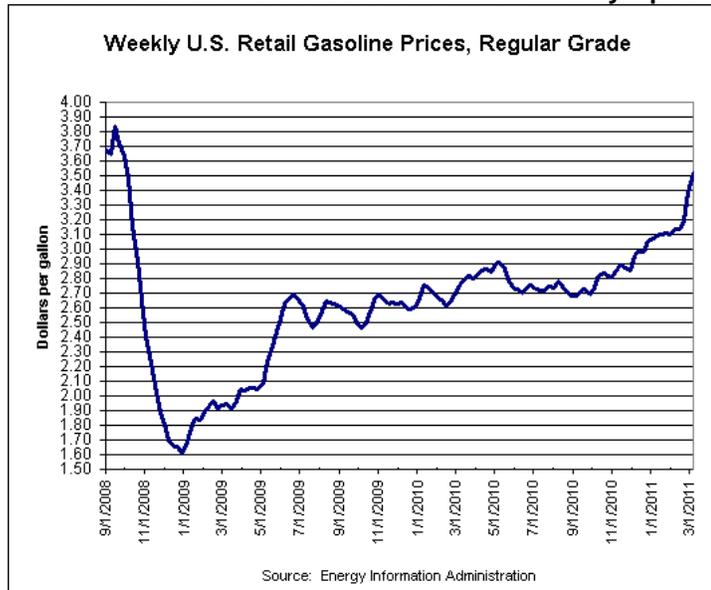
Can we expect to see \$4-a-gallon pump prices by Memorial Day?

Over the period from February 14th to March 7th, all grades of all formulations of retail gasoline prices rose 37.9-cents per gallon, or 11.9% in span. We suspect gasoline pump prices will rise further, not only driven by the impact of Middle East violence on global oil prices but also because we are heading into the summer driving season when refiners must begin producing gasoline that meets seasonal environmental air quality standards, which tends to be more costly. With the average retail gasoline price sitting at \$3.572 per gallon and under upward pressure, can we expect to see \$4-a-gallon pump prices by Memorial Day? We suspect the answer is yes, because it is impossible to see the Middle East returning to its pre-protest condition in a matter of weeks.

Higher gasoline pump prices, coupled with higher food prices due to agricultural production challenges and higher energy input costs, will force consumers to conserve somewhere in their budgets and that is likely to be in non-essential driving

At \$4 per gallon, American drivers will begin to reduce vehicle usage as they have in the past. Yes, the economy has improved, at least as measured superficially by recent job hiring and the fall in the unemployment rate, but Americans' incomes have not. Higher gasoline pump prices, coupled with higher food prices due to agricultural production challenges and higher energy input costs, will force consumers to conserve somewhere in their budgets and that is likely to be in non-essential driving. We will not be surprised to see the moving total of miles driven not only flatten out, but begin to drop. Once into a downturn it will take months before the moving total can stop declining and begin to rise again. The potential of a

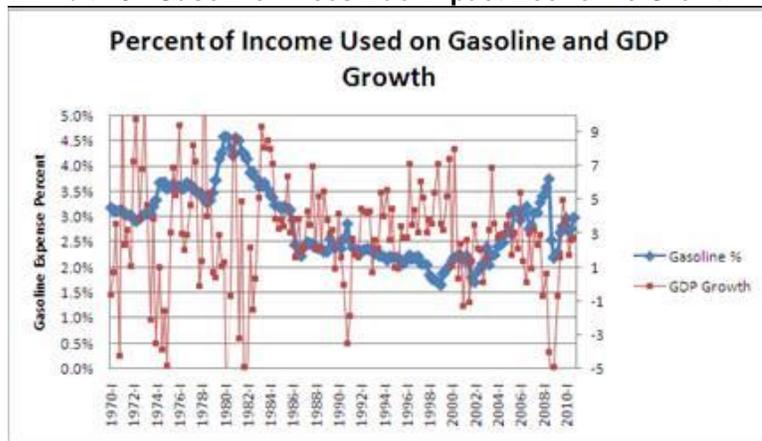
Exhibit 12. Gasoline Prices Have Been In Steady Uptrend



Source: EIA

quick reversal is not likely as long as pump prices remain in the \$4 range.

Exhibit 13. Gasoline Prices Due Impact Economic Growth



Once the percentage of consumer incomes spent on gasoline hits 3.5%, there is a negative impact on GDP growth

Recently, financial blogger James Shell analyzed the percentage of consumers' income spent on gasoline and the change in the growth/contraction rate of the economy. Mr. Shell was attempting to assess the odds of another recession developing due to the recent rise in gasoline prices. By looking at data from 1970 forward by quarter, he determined that once the percentage of consumer incomes spent on gasoline hits 3.5%, there is a negative impact on GDP growth. That happened in the 1970s and again in 2007-2008. There was also the recession created by the oil price spike

Mr. Shell calculates that gasoline at \$3.87 per gallon will trigger a recession

associated with the first Gulf War in 1990. Based on current consumer savings rates, Mr. Shell calculates that gasoline at \$3.87 per gallon will trigger a recession. We are currently less than 10% away from that pump price. Based on current refiner crack spreads, he also estimates that oil prices would have to rise to \$111 per barrel to trigger that gasoline price. Today, we are about 10% from that threshold, too. Hang on to your hats, folks!

A price-gouging investigation is the typical response when a market is behaving contrary to what politicians desire

We expect gasoline prices to remain high into the summer and to cross Mr. Shell's recession-triggering thresholds for gasoline and oil prices. As a result, we are preparing for the next wave of media headlines questioning the Obama administration's response to high gasoline prices. A price-gouging investigation is the typical response when a market is behaving contrary to what politicians desire. Not releasing oil from the strategic storage reserve is the correct move, but not a popular one given Americans' desire for relief at the pump.

Mr. Shell has given us a target oil and gasoline price to watch. We wonder when media headlines will focus on how many more than anticipated Chevy Volts and small, less profitable cars General Motors (GM-NYSE) is selling. Lines at the showrooms! Hum, what will that mean for GM's earnings and stock price?

The Undoing Of Mubarak In Egypt: Problems For Others?

While the media has moved on from covering the demonstrations in Tahrir Square in Cairo, Egypt, which ultimately forced President Hosni Mubarak to step down, most of the problems that precipitated this event have not changed. These continuing problems spell troubles for other despotic rulers in the Middle East, and quite possibly in the Western Hemisphere (Venezuela) as well. At the time of the Egyptian protests, crude oil prices moved higher, but in small increments as the prospect of regime change became clearer. The explanation was that Egypt, which produces only about 750,000 barrels a day of crude oil, was a marginal player in the global oil market and the loss of its oil would barely dent the global supply picture. Much more was made about Egypt's role in the oil market due to its control of the Suez Canal and the SUMED Pipeline, both of which are involved in the transportation of oil from the Arabian Gulf producers to Western Europe.

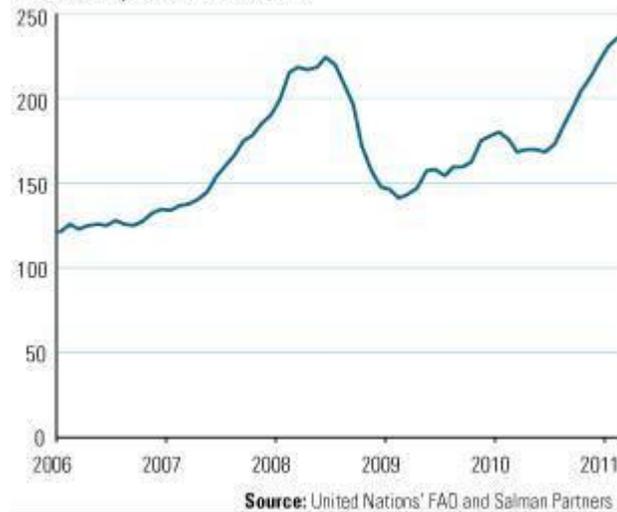
What was missed by the mainstream media was the impact domestic oil consumption had on Egypt's oil exports and the role of higher oil prices on the cost of food

What was missed by the mainstream media was the impact domestic oil consumption had on Egypt's oil exports and the role of higher oil prices on the cost of food. It was largely food price increases and the lack of available food that stimulated the civil unrest, first in Tunisia and then Egypt. We recently came across two charts that show very clearly the problem that Egypt's government was dealing with and how these forces brought down the leadership. Of course, changing government leaders doesn't necessarily solve these problems, and in fact we just read that protests over food are ongoing in Egypt.

Exhibit 14. High Food Prices Drive Social Unrest**Food Prices at Record High**

United Nations' FAO Food Price Index

Index Level, Basis 2002-04 = 100

Source: *Wealth and Capital*

The sharp rise in food costs since mid 2010 can be ascribed to the rise in crude oil prices and their impact on fertilizer, farming and distribution costs, all of which are key components in the food chain

The United Nations' food price index graph in Exhibit 14, shows that the cost of food has now surpassed the peak level experienced in 2008 just as the financial crisis emerged. The sharp rise in food costs since mid 2010 can be ascribed to the rise in crude oil prices and their impact on fertilizer, farming and distribution costs, all of which are key components in the food chain, along with weather's impact on crops around the world. Since the graph was published the price of crude oil has climbed further pushing food inflation higher. More importantly, the food inflation issue is creating shortages in many countries that create a heavy burden on the lowest classes of citizens.

Egypt is the world's leading wheat importer with almost 10 million tons a year

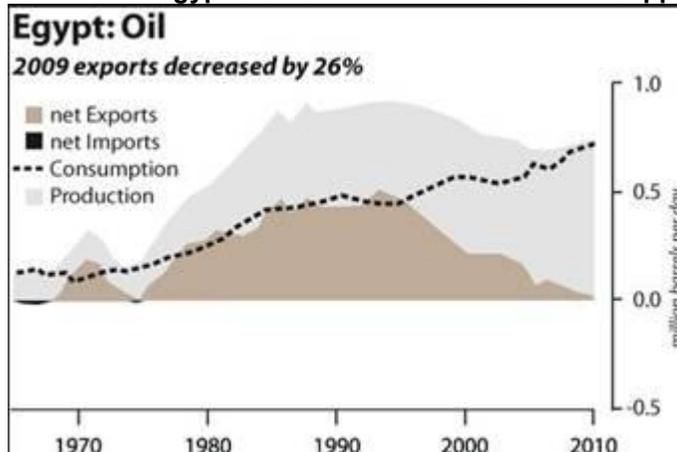
In the Middle East, many forget that food shortages and rising prices were one of the underlying factors behind the initial civil unrest in Tunisia, which then spread. Egypt is the world's leading wheat importer with almost 10 million tons a year. Iran is second with eight million tons while Algeria imports five million tons, Morocco imports four million tons and Nigeria and Turkey each import 3.5 million tons.

The current population growth rate is 2% per year, or a doubling in the population in 35 years

The growth in Egypt's population is the root cause of its citizens' suffering. Between 1960 and 2008, Egypt's population grew from 27.8 million to 81.7 million. The current population growth rate is 2% per year, or a doubling in the population in 35 years. The large population puts heavy stress on the country's ability to feed everyone as Egypt's arable land represents only about 3% of the country and mostly in the Nile Valley. Average rainfall over the whole country is about two inches per year. As a result of this arid land, the country must import 40% of its food and 60% of its grain

consumption. That requires that the country have money to pay for these imports, and that's where Egypt's oil comes into play.

Exhibit 15. Egypt's Oil Situation Hurts Its Food Supply



Source: Agora Financial

The issue is whether the Egyptian military government can improve the lot of its citizens, or will it too resort to harsh political actions to retain control over the country

Egypt's oil production peaked both on a monthly basis and yearly in 1996. Since then its production has fallen by 30%. Not only is production falling, but population growth is consuming more of the country's oil supply, too. The predicament Egypt finds itself in is that the country can no longer feed itself but it has been able to cover up the situation for some time by having oil and refined petroleum products to export. With finite oil resources, the day of reckoning has arrived. The result is the downfall of the Mubarak regime to be replaced with a military government supposedly leading toward a peaceful election down the road. The issue is whether the Egyptian military government can improve the lot of its citizens, or will it too resort to harsh political actions to retain control over the country. We expect this food and fuel issue to plague the Middle East and North African oil exporting countries as large populations eat up the financial resources earned from oil exports. Boosting oil prices to have more money to pay for food may not be an option. Increased civil unrest in the Middle East and elsewhere is likely something we will learn to live with for the rest of this year.

Does Daylight Savings Time Actually Save Energy?

Does this annual ritual, designed to generate energy savings from reduced incandescent lighting, actually save us energy today?

Over the weekend, the American populace engaged in its annual spring ritual of changing all their clocks and watches to reflect the forward jump in time. Characterized by the cute phrase, "Spring forward; Fall back," daylight savings time becomes the governing factor in our daily lives. But does this annual ritual, designed to generate energy savings from reduced incandescent lighting, actually save us energy today? The latest research suggests it doesn't.

Congress followed the railroad industry and adopted its uniform time system in 1918

Until 1883, all time in the United States and its territories was determined locally. That year the railroad industry established official time zones across the country with a set standard time within each zone. This was designed to facilitate greater efficiency in operating the national rail system. Congress followed the railroad industry and adopted its uniform time system in 1918. Because the Interstate Commerce Commission (ICC) was the only federal regulatory agency at the time, Congress granted it the authority to regulate the standard time system. Included in the law was a requirement for the country to observe daylight savings time, but it was repealed a year later. Observing daylight savings time was left as a local option.

It wasn't until 1966 that the Uniform Time Act was passed that standardized the starting and stopping dates for daylight savings time

Daylight savings time was observed nationally during World War II as part of a movement to conserve energy. It was not uniformly practiced after war's end. It wasn't until 1966 that the Uniform Time Act was passed that standardized the starting and stopping dates for daylight savings time, although it allowed individual states to stay on standard time if their legislatures approved it. In this law, the responsibility for administering daylight savings time was shifted from the ICC to the Department of Transportation.

Originally it was assumed that by extending the length of the day, more sunlight in the evening would reduce incandescent lighting needs

A 1972 amendment extended the option not to observe daylight savings time to areas on the borders of two time zones that are within the same state. This enabled neighboring communities in states to stay on the same time zone even though they were on either side of a time zone line. The length of daylight savings time was extended in 1986 from the last Sunday in April to the first Sunday in April. And in 2009, the most recent adjustment was legislated with daylight savings time now extending from the second Sunday in March to the first Sunday in November.

The latest research shows that energy usage during daylight savings time in most years increases by 0.5% to 1.0%, or not at all

Originally it was assumed that by extending the length of the day, more sunlight in the evening would reduce incandescent lighting needs. Evenings would have more people active than during the early morning hours so the amount of lighting saved would more than offset additional lighting needed during the early morning dark hours. Another benefit of daylight savings time is that the number of traffic accidents and the number of fatalities from traffic accidents would be reduced as well as the incidence of crime. Collectively, it was believed daylight savings time would save energy and reduce social costs.

The electricity savings from daylight savings time have been eliminated by increased use of compact fluorescent light bulbs (CFLs), which use significantly less energy than their incandescent bulb counterparts. Moreover, the additional daylight in the evening results in greater use of air conditioning that consumes more power than any savings from less incandescent lighting. As a result, the latest research shows that energy usage during daylight savings time in most years increases by 0.5% to 1.0%, or not at all. Energy

conservation requires working on more significant power users than the lighting savings gained by disrupting Americans' sleeping patterns twice a year.

Buffett And New England Look To Change Energy Use

They both deal with railroads' advantage over trucks for delivering goods cheaper in this country

In looking at ways the U.S. can save energy while helping its citizens stretch their budgets, we came across a theme in two widely divergent places. One was in the annual letter from Warren Buffett to the shareholders of Berkshire Hathaway (BRK.A-NYSE) and the other was in an op-ed column in *The Providence Journal* on farming in New England. How, you wonder, could a similar theme arise from these widely divergent sources? They both deal with railroads' advantage over trucks for delivering goods cheaper in this country.

Mr. Buffett talked in his shareholder letter about the importance last year to Berkshire Hathaway's earnings that came from purchasing Burlington Northern Santa Fe (BNSF), one of the nation's largest railroad companies. As Mr. Buffett explained, "The highlight of 2010 was our acquisition of Burlington Northern Santa Fe, a purchase that's working out even better than I expected. It now appears that owning this railroad will increase Berkshire's "normal" earning power by nearly 40% pre-tax and by well over 30% after-tax." The critical issue is to understand how BNSF will help boost the future financial results of Berkshire Hathaway by such a significant amount.

Mr. Buffett, in explaining his and his partner's (Charlie Munger), view of the acquisition wrote, "Both of us are enthusiastic about BNSF's future because railroads have major cost and environmental advantages over trucking, their main competitor. Last year BNSF moved each ton of freight it carried a record 500 miles on a single gallon of diesel fuel. That's *three* times more fuel-efficient than trucking is, which means our railroad owns an important advantage in operating costs. Concurrently, our country gains because of reduced greenhouse emissions and a much smaller need for imported oil. When traffic travels by rail, society benefits."

The mass production of food that flowed from this agricultural technology contributed to the start of a significant decline in the price of food

In contrast, in an article discussing the revival of farming in New England, author James RePass wrote about the history of agriculture in the United States since the days of the Pilgrims in Plymouth, Massachusetts, and how agriculture's westward movement contributed to improved economic performance for America. He pointed out that the expansion toward the Great Plains and beyond contributed to a "wondrous techno-optimism" in 19th Century America. The mass production of food that flowed from this agricultural technology contributed to the start of a significant decline in the price of food.

Mr. RePass cited figures showing that in 1900, the food budget consumed 43% of family income, but by 2010 it was only 10%. While food costs were dropping, the workforce engaged in

The problem for New England is compounded by the fact it is at the tail end of a national shipping chain and its goods are 95% dependent on trucking and only 5% on rail

These developments are the types of changes, at the margin, which can impact future energy demand

agricultural production dropped from 50% of total employment in 1900 to under 2% in 2000, according to the U.S. Department of Agriculture. Despite the significant cost reduction and economy-boosting benefits from technology leading to mass production of our food, the current trend in food prices is going in the wrong direction and at an alarming pace. Mr. RePass highlighted the problem:

“Unlike the Pilgrims, who grew their own food, we live in a highly organized globalized distributive economy. The food at your store may be processed, canned, bagged and shipped dozens of times before it gets to you – every step fueled by (once) cheap petroleum. But the era of cheap energy is over.”

The problem for New England is compounded by the fact it is at the tail end of a national shipping chain and its goods are 95% dependent on trucking and only 5% on rail. This contrasts with the rest of the country where the ratio is closer to 80/20. Given what Mr. Buffett cited about the relative energy-efficiency (and cost-efficiency, too) of rail over trucks, one can see that New England is destined to suffer from high food prices relative to the rest of nation. This food cost structure adds to the challenges the region must overcome in order for its economy to prosper, or at least become more competitive, in the future. Mr. RePass’s article dealt with the emergence of local farming operations, including one raising hens allowing the farm’s owner to sell eggs fresher and for \$1 a dozen less than organic eggs sell for in local grocery stores.

Mr. RePass visited with various people working on growing new and different food crops in New England through the use of large greenhouses. He pointed out that a whole new generation of farmers, highly educated, and some from non-farming backgrounds, have begun year-round agriculture in New England greenhouses often employing clever heat-retention systems that keep crops from freezing at night. Some use petro-heat systems, but others do not. New England has a relatively short growing season, but increasingly the basic staples for diets are being grown year-round. Equally important is the growth in demand that has contributed to the revival of local farmers’ markets and a growing number of direct customers, such as hospitals, school systems, college/university campuses and restaurants. These developments are the types of changes, at the margin, which can impact future energy demand.

Zigzagging: ConocoPhillips Cuts Gas Drilling In Canada

The purchase was to obtain the substantial North American natural gas proved reserves, production and exploration prospects

ConocoPhillips’ (COP-NYSE) experience with natural gas has been marked by poor timing. In December 2005, ConocoPhillips offered to purchase independent oil and gas explorer, Burlington Resources, Inc., in a \$33.9 billion cash and stock transaction. The rationale for ConocoPhillips’ purchase was to obtain the substantial North American natural gas proved reserves, production and exploration prospects of Burlington Resources. At the time of the deal,

ConocoPhillips Chairman James Mulva stated it was his firm conviction that natural gas was going to become a more important fuel source in the North American energy mix. Because ConocoPhillips was not as well positioned in the North American gas business as others, it was deemed worth the high cost to purchase Burlington Resources.

Exhibit 16. Burlington Deal Marked High Point For Gas Prices



Source: EIA, PPHB

Since the time of the Burlington Resources acquisition, natural gas prices either have either traded flat or lower

As can be seen from the graph in Exhibit 16, natural gas wellhead prices in the United States had been steadily rising from the low during the warm winter of 2001-2002. The impact of the damage to Gulf of Mexico gas supplies due to Hurricanes Katrina and Rita led to a spike in gas prices during the fall of 2005. Since the time of the Burlington Resources acquisition, natural gas prices either have either traded flat or lower than suggested by then market trends. The exception was during the commodity boom in late 2007 and early 2008 before the onset of the financial crisis. While the acquisition of Burlington Resources was announced during the 2005 hurricane-induced price spike, the deal's economics were based on the trend in natural gas prices and projections of where they were headed. Those projections have not worked out.

ConocoPhillips, the third largest natural gas producer in Canada, cut the number of new gas wells it plans to drill and will shift the funds into increasing its oil sands output

Last week, in response to the extended period of low natural gas prices, ConocoPhillips, the third largest natural gas producer in Canada, cut the number of new gas wells it plans to drill and will shift the funds into increasing its oil sands output. Neither move was a big surprise given the relative levels of crude oil and natural gas prices and their expected trends. ConocoPhillips had already taken drastic action in response to low natural gas prices by shutting down wells accounting for 12% of its Canadian output for three months late last year. It also restructured its natural gas operations by laying off 80 employees and shifting others into oil sands work.

He cast doubt on the near-term prospects for the construction of the Mackenzie Valley natural gas pipeline

ConocoPhillips' strategy for its natural gas portfolio is to reduce new investment and allow attrition to shrink its production output. As confirmed by ConocoPhillips' Canadian unit president, Joe Marushack, the number of wells the company is drilling is down. "We're not really necessarily focusing on maintaining production," he said. Mr. Marushack pointed out that, "If you go back to 2008, folks were drilling under the assumption of \$8 gas. That's a very different capital profile than what you'd use when you have \$3.50 gas."

In discussing the future for ConocoPhillips in Canada, Mr. Marushack cast doubt on the near-term prospects for the construction of the Mackenzie Valley natural gas pipeline. This project, which was once pitched as the most economical way to move Alaskan North Slope gas to market while also moving the huge northern Canadian gas reserves down to the oil sands area where they could power that fuel's development, has struggled with the escalating cost to build the pipeline. Mr. Marushack did suggest that liquefied natural gas exports from the proposed Kitimat, British Columbia, terminal is a "pretty new concept, but I think it warrants folks looking at." He went on to say, "We've looked at it here. It might be something we consider again in the future." But he also said that the company's focus would be on its oil sands assets.

Last year, ConocoPhillips sold its 9% stake in Syncrude Canada Ltd. to Sinopec of China for \$4.65 billion. It is now investing heavily in developing new oil sands projects. One expansion comes through its 50% partnership with Cenovus Energy Inc. (CVE-NYSE) on several projects and the other is its Surmont development, which is owned along with Total E&P Canada, a subsidiary of Total S.A. (TOT-NYSE) of France.

Already discovered oil in older fields is potentially the most profitable oil an oil company will ever produce

This year, ConocoPhillips will launch tests of several new oil sands technologies, including the use of solvents to help boost recovery of oil sand bitumen, and well improvements that use ceramic membranes and vacuum tubing to better separate oil from water and help reduce heat loss. These are interesting new technologies that could improve the economics of oil sands projects, enabling the industry to extract more of the resource. This is important as globally the oil industry has left behind a large portion of reserves in fields because both the technology to extract the additional oil did not exist and the economics of the processes were not profitable. Already discovered oil in older fields is potentially the most profitable oil an oil company will ever produce. While the percentage of oil extracted from fields steadily improved over time until it averaged about 35% today, boosting it to 70% would have a huge impact on the global oil resource base for the petroleum industry. We anticipate a greater focus among oil and gas companies in the future to improve oil recovery technologies and economics, much as the industry has done and continues to do with its gas shale developments.

Electric Vehicles Struggle To Gain Ground On Battery Cost

Cumulative sales for the first two months of this year for the General Motors Volt and the Nissan Leaf electric vehicles were 756 units

A report from *hybridcars.com* says that cumulative sales for the first two months of this year for the General Motors (GM-NYSE) Volt and the Nissan (NSANY.PK) Leaf electric vehicles (EV) were 756 units. That compares with 42,726 hybrid vehicles. Part of the problem for EVs is their cost, in the case of the Volt, and logistics on the part of the Leaf. Nissan is delivering cars against prior orders, but the company is trying to make sure that the new owner is prepared with a charging station and that the area where the car will be used has public charging facilities. We wonder how long this game can continue of only delivering EVs where the company doesn't feel threatened about a lack of charging stations. We also wonder how much Nissan is checking the weather and temperatures since it is well known that very cold temperatures severely reduce the performance of batteries – both from starting problems to severe degradation of the vehicle's performance on a single charge. Our bet is that there aren't many EVs being sent to North Dakota, Minnesota, Illinois or Maine at the present time.

What was more interesting was reading a financial blog about the EV industry and the cost of batteries. The writer quoted sections from Secretary of Energy Dr. Steven Chu's presentation at last year's United Nations Climate Change Conference in Cancun, Mexico. In that presentation, Secretary Chu said, "And what would it take to be competitive? It will take a battery, first that can last for 15 years of deep discharges. You need about five as a minimum, but really six- or seven-times higher storage capacity and you need to bring the price down by about a factor of three. And then all of a sudden you have a comparably performing car; let's say a mid-sized car, which has a comparable acceleration and a comparable range."

"Now, how soon will that be? Well, we don't know, but the Department of Energy is supporting a number of very innovative approaches to batteries and it's not like it's 10 years off in the future, in my opinion. It might be five years off in the future. It's soon. Meanwhile the batteries, the ones we have now, will drop by a factor of two within a couple of years and they're gonna get better. But if you get to this point, then it just becomes something that's automatic and I think the public will really go for that."

Once battery prices fall into the \$300 per kilowatt hour range it will make EVs acceptable and desirable for American consumers

The implication in Secretary Chu's comments was that once battery prices fall into the \$300 per kilowatt hour (kWh) range it will make EVs acceptable and desirable for American consumers. The challenge shows up in the 2010 financial results from battery manufacturer A123 (AONE-Nasdaq). The company had 69.2 million watt-hours of battery shipments last year. It generated \$73.8 million in battery sales, but had \$94.3 million in production costs. If you do the math, that comes out to \$1,067 per kWh of sales and \$1,363 per kWh of costs. By this measure, the battery industry is more than

It looks like the success of EVs is much further off into the future than the media and government officials would lead you to believe

\$1,000 per kWh away from the target that Secretary Chu says is crucial for making EVs competitive.

The blogger went on to point out that at the recent Geneva auto show, while there was lots of media coverage about the great future of EVs, the show reflected something entirely different. Auto manufacturers' car models on exhibit demonstrated that the companies are turning to diesel and natural gas fuel systems, direct fuel injection, dual clutch transmissions and start-stop systems as their preferred mass market solutions. It looks like the success of EVs is much further off into the future than the media and government officials would lead you to believe. Without government support via subsidies to EV buyers and handouts to battery manufacturers along with a regulatory agenda that leaves EVs as the only solution for auto manufacturers to meet increased carbon emissions targets, EVs will struggle to establish a meaningful share of the global auto market.

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