
MUSINGS FROM THE OIL PATCH

October 20, 2015

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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

Third Quarter Realism Sets Stage For Next Industry Phase

At the beginning of this year, Schlumberger aggressively cut its organizational structure in what was perceived as an overly negative view of the emerging downturn

On Friday, Schlumberger Ltd. (SLB-NYSE) was the first oilfield service company to announce its third quarter earnings, which were down 49% but essentially in line with Wall Street's estimates. What wasn't on the analysts' radar screens, however, was the demonstratively more negative view of the next stage of the oil and gas industry, and its impact on the energy service business, expressed by the company's leader. At the beginning of this year, Schlumberger aggressively cut its organizational structure in what was perceived as an overly negative view of the emerging downturn. In hindsight, Schlumberger's management team seems to have been more right than wrong in its judgement. Now the company's management is less optimistic about the timing of the recovery it projected earlier and is suggesting more layoffs are coming before yearend. As Schlumberger's CEO Paal Kibsgaard stated during the company's earnings call, "...while our macro view has not changed in terms of a tightening supply and demand balance, and an expected improvement in oil prices, we have to factor in that the likely recovery in our activity levels now seems to be a 2017 event." Oops, there goes the belief in a V-shaped recovery by early in 2016.

Now the company has to make further meaningful adjustments

As Schlumberger accepts a more negative outlook about the industry's downturn and its duration, the company's management team is acting in concert with many of its customers and competitors. They offered the following statement about their future strategy and near-term actions: "We communicated in our previous earnings call that we were prepared to live with our existing cost base going forward providing we were close to the bottom of the markets and that the activity recovery was only a couple of quarters out. As a result we carried our cost base forward into Q3, which had some negative impact on our operating margins..." Now the company has to make further meaningful adjustments.

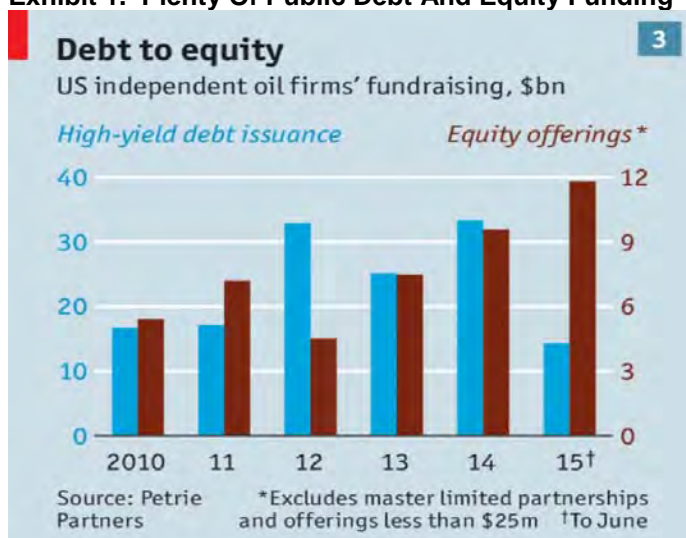
If their competitors haven't thought about taking similar steps, they are now on notice they had better consider radical restructuring steps in order to survive and better compete

For many of the E&P companies, the siren song of growth in the era of \$100 oil was lubricated with cheap capital

With a view that capital spending will be down meaningfully in 2016, Schlumberger, along with the rest of the industry, is being forced to address its capacity, which unfortunately means layoffs. From a positive viewpoint, the company has begun further restructuring steps to lower costs and improve delivery of its technology, products and services. This means “restructuring of our global manufacturing and distribution network...” The mechanics of the restructuring are less important than the philosophy that reorganizing the company’s business will be critical to sustaining returns, and importantly, positioning Schlumberger to maximize returns in the industry’s eventual upturn. If their competitors haven’t thought about taking similar steps, they are now on notice that they had better consider radical restructuring steps in order to survive and better compete. Failing to take steps could severely damage those companies.

Not only will the oilfield service industry have to rethink its business structure and consider radical adjustments to business models in order to prosper in the future, so to will their customers. Exploration and production (E&P) companies are being forced to determine how to sustain their operations, especially in light of highly levered balance sheets as revenues and earnings drop with low oil and gas prices. For many of the E&P companies, the siren song of growth in the era of \$100 oil was lubricated with cheap capital. Clearly, everyone – industry executives and investors - knew that the shale revolution required loads of up-front money in order to purchase acreage, determine development programs, under-take high-cost drilling and completion efforts, and then hope that there was adequate oil and gas takeaway capacity to produce the hydrocarbons. This last step was critical to generate revenues and operating cash flow. The key was that there was plenty of cheap capital ready, willing and able to finance the E&P industry.

Exhibit 1. Plenty Of Public Debt And Equity Funding

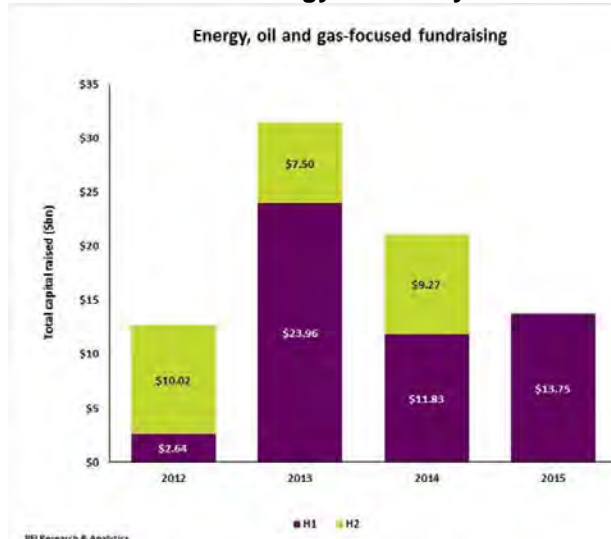


Source: *The Economist*

The problem for the E&P industry was that few of its leaders were willing to follow the example of Odysseus

The problem for the E&P industry was that few of its leaders were willing to follow the example of Odysseus in *The Odyssey* to avoid hearing the song coming from the island of Siren. He was told that if he listened to the song, he would want to go to the island and then remain there the rest of his life, something he wanted to avoid during his homeward journey to Ithaca. To avoid falling victim to the song, he plugged his and his men’s ears with wax and he had his men lash him to the mast. For E&P executives the siren song was cheap capital – public market debt and equity, and private equity money interested in building new, and presumably highly-profitable companies - and most succumbed to that song.

Exhibit 2. Lots Of Energy PE Money On Sidelines



Source: PEI Research

The huge pools of private equity capital that have been looking for energy investment opportunities are shifting their focus from growth to survival

As lousy third quarter earnings are reported and commercial banks haircut the borrowing bases E&P companies rely on to support their aggressive capital spending programs, public debt and equity markets are closing as avenues for raising new capital. The huge pools of private equity capital that have been looking for energy investment opportunities are shifting their focus from growth to survival, which often means helping to consolidate industry sectors to restore greater pricing discipline and hopefully improve profitability. Without access to outside capital, companies need to generate cash from selling assets, which can often be difficult because the greatest value may lie in the company’s best assets. Bankruptcies and fears about potential bankruptcies are becoming more prominent stories in the financial press, and are certainly heavily trafficked within the industry rumor mills.

While the next 45-60 days will be full of bad news and doom and gloom outlooks for the industry, this “medicine” is what is needed to alter the outlook for the business. The V-shaped industry recovery

“Growth” and “Investment” as the top words in the earlier plan were replaced with “Efficiency” and “Value” in the new plan

scenario, a popular view just a few months ago, is dead. Now the consensus calls for a “bathtub” or U-shaped recovery with the only question being how long the bottom will last. If there is another leg down for industry activity and oil and gas prices, the current consensus might begin to consider the L-shaped recovery, or a lack of any growth, is the industry’s future.

Reflecting on how dramatically the environment has changed, we were intrigued to read an article about Repsol’s (REPY-OTC) latest five-year plan unveiled last week. Their 2016-2020 plan is called “Value and Resilience” in contrast with their 2012-2016 plan that stressed “Growing from our strengths.” The change in emphasis was highlighted in the story on EnerCom, Inc.’s web site, *Oil and Gas 360*. The story contained a chart showing the number of occurrences of certain words in the two five-year presentations. “Growth” and “Investment” as the top words in the earlier plan were replaced with “Efficiency” and “Value” in the new plan.

Exhibit 3. Shifting From Growth To Value

Repsol Word Counter		
	2012-2016	2016-2020
Growth	15	4
Investment	18	8
Exploration	9	2
Efficiency	1	11
Value	2	12

Source: EnerCom, Inc.

This industry cycle has been and will continue to be different from prior cycles. It will prove how correct Mark Twain’s phrase was that “History doesn’t repeat itself, but it does rhyme.” The challenge is to determine the rhymes.

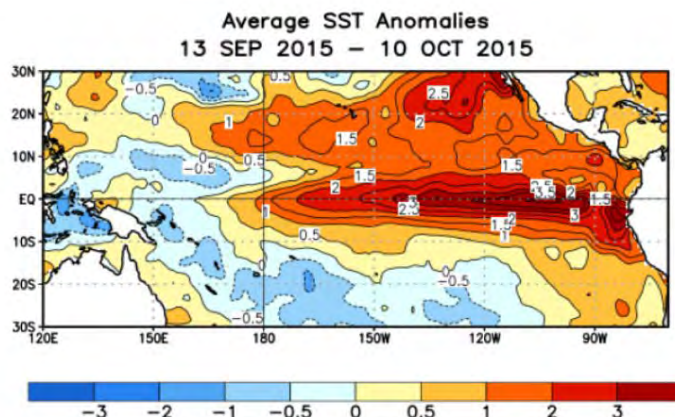
Will El Niño Be Kiss Of Death For NA Natural Gas Industry?

As a result, the view that we were in the throes of a strong El Niño event have solidified – the only questions now are how strong will it be and how long will it last?

The waters of the central region of the South Pacific Ocean have been bubbling as hot temperatures have sent surface temperatures to record highs. As a result, the view that we were in the throes of a strong El Niño event have solidified – the only questions now are how strong will it be and how long will it last? At the present time, the consensus says it will be strong, but not the strongest in recent times. As to its duration, the National Oceanic and Atmospheric Administration (NOAA) said there is a 95% probability this El Niño will last through the fall and winter and then weaken in the spring. A key question remains as to how strong this event will be compared to past El Niños, especially the very strong ones of 1997-1998 and 1982-1983. Based on ocean temperatures and heat content, this event is likely to be the second strongest since record keeping

began in 1950. That means it will likely be weaker than the 1997-1998 El Niño, but stronger than the 1982-1983 one.

Exhibit 4. Conditions Helping Form El Niño



Source: NASA

“Whether El Niño gets slightly stronger or a little weaker is not statistically significant now. This baby is too big to fail.”

The 2015 El Niño may be defined by a recent quote by Bill Patzert, a climatologist at the National Aeronautics and Space Administration’s (NASA) Jet Propulsion Laboratory. He declared, “Whether El Niño gets slightly stronger or a little weaker is not statistically significant now. This baby is too big to fail.” There is no doubt in the minds of every meteorologist and weather forecaster based on their comments that North America’s weather this winter will be impacted by this event. But questions remain: how, and in what way? As London’s *Daily Mail* put it on their web site, “This winter will not be normal.”

It means a warmer but potentially wetter winter

For the North American energy business, whatever the weather is this winter will play a critical role in what happens to future commodity prices. The commodity most sensitive to price changes may be natural gas, which continues struggling in the face of oversupply and weaker than expected demand. What does El Niño mean for the upcoming winter? In general, it means a warmer but potentially wetter winter. The issue is that not every area of North America will be impacted in the same way.

Besides El Niño, the continent’s weather will also be impacted by the residual effects of the eruption of Iceland’s Bardarbunga volcano

Evelyn Browning Garriss, the publisher of the *Browning World Climate Bulletin*, in the October issue discussed the upcoming fall and winter weather for North America. Much of her discussion was explaining the development of a strong El Niño and its likely impact on weather patterns spanning the next six months. She points out that besides El Niño, the continent’s weather will also be impacted by the residual effects of the eruption of Iceland’s Bardarbunga volcano. Last winter, North American weather was dominated by a moderate El Niño and the last, lingering impact of the large 2011 eruptions of Russia’s Sheveluch volcano and Iceland’s Mt. Grímsvötn.

“Historically, this does not bring prices down but it does drive harvest and drying costs up”

In summarizing her autumn weather outlook, the biggest question mark surrounds precipitation. As Ms. Garriss writes, “El Niños typically bring a lot of moisture to the US, starting in mid-autumn. Storms sweep up the East Coast and hit the parched West Coast. Unfortunately, in 80% of similar years it also drenches the Midwest, making the harvest of late-planted crops difficult. Historically, this does not bring prices down but it does drive harvest and drying costs up.” The latter point is a positive for demand for propane in the Midwest as this is the primary fuel used for crop drying in the region.

Exhibit 5. This Fall Looks Warm And Wet



Warm	Cool	Dry	Wet
24°C or more higher than normal temps.	24°C or more lower than normal temps.	75% or less of normal moisture.	125% or more of normal moisture.

figures 5A-B † A moderate Russian volcanic eruption will make this region colder. *If El Niño conditions continue.
© Evelyn Browning Garriss/Browning Media

Source: *Browning World Climate Bulletin*

Considering the weather patterns that will dominate the 2015-2016 winter, Ms. Garriss writes, “Strong El Niños normally bring warm, dry

“If history repeats itself, expect lower heating demands”

winters to the northern tier of states and Southern Canada. Meanwhile the Southern US has cool, wet winters. Large Icelandic eruptions typically bring warm winters to the Midwest, Northeast and Canada from the Great Lakes to the Atlantic Provinces. If history repeats itself, expect lower heating demands.” That is not good news for the domestic energy business, but certainly good news for homeowners. It may also be good news for underlying economic growth as the combination of lower heating bills and reduced gasoline pump prices may result in more money being spent on other products and services.

Exhibit 6. Warm Winter Hurts Energy Demand



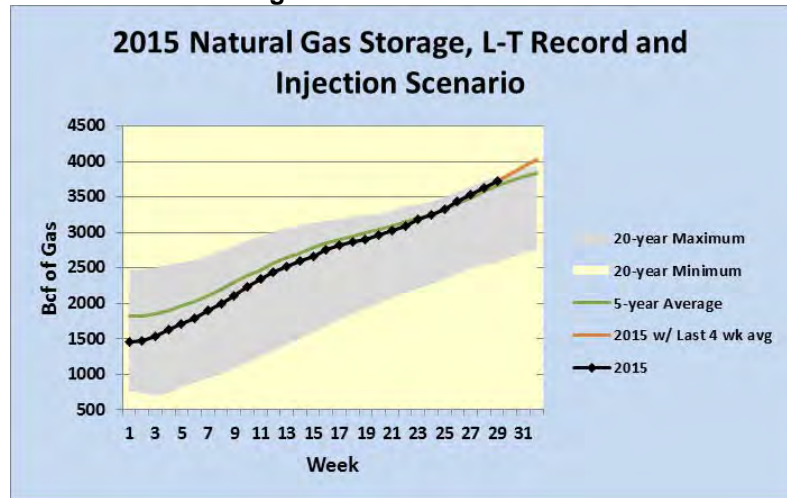
Source: *Browning World Climate Bulletin*

If we do exceed 4,000 Bcf, it would mark the first time in history that the industry began the heating season with that much natural gas in storage

During the past four weeks of the natural gas storage injection season, weekly volumes have averaged 100 billion cubic feet (Bcf). As of the week ending October 9, there was 3,733 Bcf of gas in storage, which puts current storage up at the top of the five-year average weekly storage volume peak. Forecasters have been anticipating that total gas storage will end the injection season somewhere close to, or possibly slightly in excess of 4,000 Bcf. If we do exceed 4,000 Bcf, it would mark the first time in history that the industry began the heating season with that much natural gas in storage. During 2009-2013, with the exception of 2012, the industry ended the injection seasons with slightly over 3,800 Bcf of gas in storage. In 2012, the industry was able to slightly exceed 3,900 Bcf of gas in storage. Last year, the industry began the heating season with only 3,571 Bcf of gas in storage, which was due to the injection season beginning with the second lowest storage volume since 1994 - only 822 Bcf.

As we model out the remainder of the storage injection season, it is likely the industry will continue large weekly injection volumes so we do exceed 4,000 Bcf in storage. Even if we fail to average 100 Bcf per week of average injection volumes, we will still wind up with a near-record high. The problem with the current natural gas storage situation is that while dry gas production volumes are declining, expectations are growing that those falling volumes will be joined by

Exhibit 7. Gas Storage On Track To Record Volume

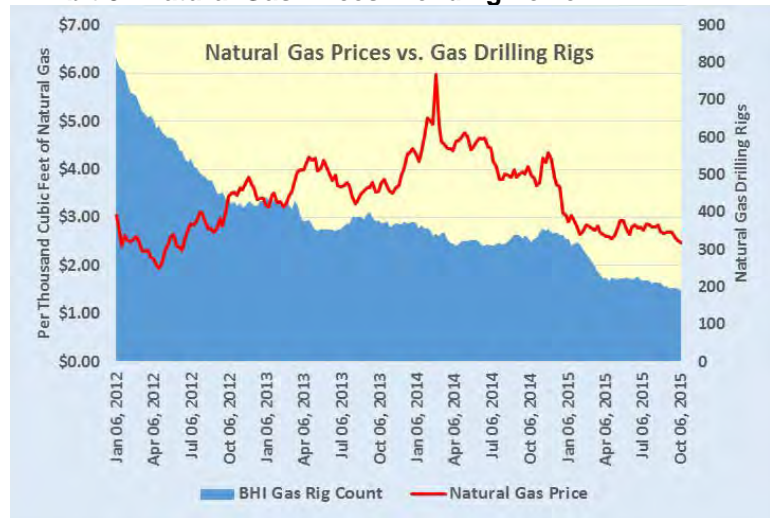


Source: EIA, PPHB

The net result is that natural gas prices continue to weaken

declining volumes of natural gas produced in association with crude oil due to falling oil-directed drilling, there continues to be too much gas being produced relative to demand. The net result is that natural gas prices continue to weaken as shown in Exhibit 8. Last Friday, the NYMEX futures near-month price closed down two cents at \$2.43 per thousand cubic feet (Mcf).

Exhibit 8. Natural Gas Prices Trending Lower



Source: EIA, Baker Hughes, PPHB

Coupled with low natural gas futures prices, there has been a significant decline in the 12-month strip price for natural gas recently. As of October 15, 2015, the NYMEX 12-month natural gas strip was at \$2.735/Mcf. That was down from \$2.761/Mcf the prior week. Compared to one month ago, the 12-month strip price is

Compared to last year, the 12-month strip price is down over \$1.00/Mcf, or 27.2% from \$3.789/Mcf

down 7.2% from \$2.946. What is really telling is that compared to last year, the 12-month strip price is down over \$1.00/Mcf, or 27.2% from \$3.789/Mcf. At some point, lower natural gas prices will pressure producers to further reduce their natural gas drilling and well completion activity in hopes that curtailed output will eventually push gas prices higher.

We found that that winter experienced the least amount of natural gas consumed for any winter during 1994 to 2001

The weakness in the 12-month natural gas strip price is a reflection not only of the current over-supply but also confidence that there will be plenty of gas in storage next spring and summer that will moderate the industry's need to bid up prices to secure more gas supply for the following winter. To examine this situation, we went back to look at the level of gas consumption during the last strong El Niño period in 1997-1998. We found that that winter experienced the least amount of natural gas consumed out of any winter from 1994 to 2001. It was only during the recession that followed the attacks of 9-11 that gas use fell below the volume consumed in the winter of 1997-1998.

We should consider a winter burn rate somewhere close to that of 1997-1998's consumption

Given a strong El Niño during the upcoming winter, it is logical to assume that natural gas consumption will be weak. The amount of gas consumed during the winter of 1997-1998 was 1,680 Bcf. The weakest winter demand in recent times was the extremely warm winter of 2011-2012 when the U.S. burned only 1,322 Bcf of gas. If we look at the most recent five-year average for winter gas consumption, it was 2,163 Bcf, but that included the extremely cold winter of 2013-2014 when we used 2,957 Bcf. Unless all the meteorologists are wrong about the upcoming winter weather pattern (*The Old Farmer's Almanac* cold and snowy forecast notwithstanding), we should consider a winter burn rate somewhere close to that of 1997-1998's consumption. Our conclusion reflects the belief that more gas-heating consumers plus more natural gas used in generating electricity will offset some of the negative demand impact from warm winter temperatures.

Natural gas futures prices that spring were in the \$4.50/Mcf range, but they were sliding from the \$5.50/Mcf in 2010 toward \$2.00/Mcf in April 2012

If we assume that the natural gas injection season ends with 4,000 Bcf in storage, which could grow further if we have an unseasonably warm November, and we consume 1,700 Bcf, next spring will find gas producers looking at about 2,300 Bcf of gas in storage. That storage volume would be similar to the amount that was in storage in 2011. Natural gas futures prices that spring were in the \$4.50/Mcf range, but they were sliding from the \$5.50/Mcf in 2010 toward \$2.00/Mcf in April 2012. Given where natural gas prices are presently and the level of the 12-month strip (\$2.735/Mcf), it is difficult to envision gas prices being appreciably higher and quite possibly they could be meaningfully lower.

The key to how much lower gas prices might fall, if they do, depends on the then-current volume of gas output and the direction in which production is trending. While it is likely that production will fall, the issue will become the pace of that decline and the expectation about

Barring some dramatic event that alters one or more of these factors, next year does not look particularly encouraging for the natural gas industry

how quickly producers will be induced to jump back into drilling. That decision will reflect producer views of future gas prices – both how high and how quickly they will get there. In addition, we will continue dealing with issues such as the health of the economy, the demand for natural gas from the power generation market given additional coal plants shutting down, and what a continuation of El Niño conditions during the summer and possibly into the following fall and winter, albeit likely at a much reduced strength, mean for demand. Barring some dramatic event that alters one or more of these factors, next year does not look particularly encouraging for the natural gas industry.

The Climate Change Whirlwind Is Whipping Up!

According to the latest data, there will be 196 countries in attendance and thousands of delegates and media

We warned you in a recent *Musings* about the avalanche of climate change rhetoric that would dominate the media leading up to the Paris climate change conference that starts in about 40 days. The conference, 2015 United Nations Climate Change Conference (COP21), is the 21st yearly session of the Conference of the Parties to the 1992 United Nations Framework Convention on Climate Change (UNFCCC). The conference is also referred to as CMP11 as it marks the 11th session of the Meeting of the Parties to the 1997 Kyoto Protocol. According to the latest data, there will be 196 countries in attendance and thousands of delegates and media. Paris in early December is certainly an attractive location.

The goal of COP21 is to secure a legally binding universal agreement by the nations to reduce their carbon emissions

The goal of COP21 is to secure a legally binding universal agreement by the nations to reduce their carbon emissions in an effort to increase the likelihood that the planet's temperature rise will be held to 2° Celsius (3.6°Fahrenheit) by the end of the century. As we wrote in that earlier *Musings* article, the last big push for a climate change treaty came during 2009 at COP15 held in Copenhagen, Denmark. At that conference, President Barack Obama, along with Secretary of State Hillary Clinton, tried to orchestrate a climate agreement that would be supported by both developed and developing countries. The effort failed for a number of reasons, but the language of the agreement adopted at COP15 actually contributed to the split between the groups.

A very interesting article about what happened in Copenhagen was written by Oliver Tickell on *counterpunch.com* and was published March 31, 2014. The article was issued on the very same day that the United Nations' Intergovernmental Panel on Climate Change (IPCC) released its then-current assessment of how human emissions of greenhouse gases are affecting planet Earth and will continue to do so into the future. As the article's author put it, the IPCC said that "We can expect declining crop yields, increasing climate instability, more extreme weather events, rising sea levels, ocean acidification – and all the rest of it." It's hard to imagine what "the rest of it" would bring us, but it sounds bad.

Unfortunately, the conference began under a cloud because the draft text of the agreement (Danish Text) was leaked and published in a front-page story in *The Guardian* newspaper

Mr. Tickell suggested that COP15 was the most recent “best hope” for a global climate agreement, even though the issues to be decided were “thorny and complex.” Those issues included how the emissions cuts were to be shared among the countries and how much money rich countries would pay poor ones to help them adapt to the devastation caused by climate change. Unfortunately, the conference began under a cloud because the draft text of the agreement (Danish Text) was leaked and published in a front-page story in *The Guardian* newspaper. The Danish Text had been agreed to by several European Union countries. The proposed text, among other measures, proposed ending the Kyoto Protocol mechanisms, getting developing countries to agree to emissions cuts, and to weaken the role of the UNFCCC, the organizing body of the conference, in dealing with future negotiations and running climate financing arrangements.

The United States spied on key countries involved in the conference

As the author explained, the issue in the Danish Text was the starting negotiating position and would be moderated. More importantly, the points in the text were not necessarily issues that both sides would not be willing to debate, but rather the issue became how the text was disclosed. As we learned in early 2014 due to the release of documents by Edward Snowden, the former U.S. National Security Agency (NSA) employee, the United States spied on key countries involved in the conference. The evidence was contained in an article posted on the NSA’s internal web site stating: “While the outcome of the Copenhagen Climate Change Conference remains uncertain, signals intelligence will undoubtedly play a significant role in keeping our negotiators as well informed as possible throughout the 2-week event.”

Other documents disclosed that the U.S. government was monitoring Danish officials as well as Chinese officials prior to the conference

Certain paragraphs of the document were labeled TS (Top Secret) and thus classified while other paragraphs were labeled SI (Selective Intelligence), meaning they were obtained through monitoring electronic communications. Other documents disclosed that the U.S. government was monitoring Danish officials as well as Chinese officials prior to the conference. In fact, some Danish officials remarked how surprised they were that American officials were so knowledgeable about the details of the Danish policy recommendations and that the Danish officials were prepared to salvage the conference if its results did not unfold as hoped.

With respect to China, a NSA document stated that the U.S. knew of their efforts to align their negotiating position with that of India’s. The memo “detailed China’s efforts to coordinate its position with India and ensure that the two leaders of the developing world are working towards the same outcome.”

Given these revelations, maybe it was not a surprise that President Obama and Secretary Clinton were able to locate the secret negotiating session between the Chinese delegates and European leaders over the final language of the conference. President Obama

The interesting scenario of President Obama questioning the Chinese delegates and getting only “no” answers that suggested that the Chinese were obstructionists

took credit for forcing his way into this secret meeting and helping shape the final statement. Some observers claim that the U.S. pressed its position aggressively against the Chinese delegates in an attempt to make them look bad. The fact that China’s president failed to attend the conference and only sent lower-level delegates created the interesting scenario of President Obama questioning the Chinese delegates and getting only “no” answers that suggested that the Chinese were obstructionists. The Chinese leader did not attend because no one knew that President Obama would attend until partway through the conference. As we have learned since 2009, demonizing his opponent is a favored political negotiating strategy of President Obama, although it often drives negotiations into the ditch.

First, we fully expect either right before or at Paris that President Obama will hold a press conference and declare his official opposition to the Keystone XL pipeline

So what can we expect from the U.S. government as we approach COP21? First, we fully expect either right before or at Paris that President Obama will hold a press conference and declare his official opposition to the Keystone XL pipeline. This announcement will be presented as the first step in America’s pledge to help cut global carbon emissions. This scenario was previewed during the CBS *60 Minutes* show’s interview of President Obama by reporter Steve Kroft. When questioned about the President’s leadership being challenged by Russian Premier Vladimir Putin’s actions in Syria, President Obama said his definition of leadership was different from Mr. Kroft’s version. President Obama stated, “My definition of leadership would be leading on climate change, an international accord that potentially we’ll get in Paris.” Since he can’t assure that COP21 will yield that universal legally-binding emissions-treaty, he can show he is a real leader by starting the conference by declaring Keystone XL dead!

Dr. Dyson has had a long involvement with climate change research and has been a critic of the lack of scientific research rigor that has driven the climate change movement

In the face of these histrionics over climate change, a new report authored by Indur M. Goklany of the Global Warming Policy Foundation (GWPF) and titled CARBON DIOXIDE The good news, was published. The report contained a forward written by Professor Freeman Dyson FRS, a world-renowned theoretical physicist. Dr. Dyson is Professor Emeritus of Mathematical Physics and Astrophysics at the Institute of Advanced Study in Princeton where he held a chair for many years. Dr. Dyson has had a long involvement with climate change research and has been a critic of the lack of scientific research rigor that has driven the climate change movement. In his forward he challenges his fellow scientists to examine the scientific evidence about carbon and emissions and consider the alternatives to their blind faith in computer models that have consistently failed to explain climate trends.

Mr. Goklany is described in the report as “an independent scholar and author. He was a member of the U.S. delegation that established the IPCC and helped develop its First Assessment Report. He subsequently served as a U.S. delegate to the IPCC, and an IPCC reviewer. He is a member of the GWPF’s Academic

“From this insight, he deduced that an increase in atmospheric carbon dioxide concentration would benefit mankind by enhancing the growth of plants”

The AP says that “deniers” or “skeptics” with respect to climate change should not be used

According to the research, the increase in crop yields has meant 11%-17% reduction in the loss of habitat that would have otherwise occurred

Even the IPCC has acknowledged that productivity is 5% greater than that experienced during pre-industrial times

Advisory Council.” His report examines the global benefits of carbon dioxide compared to its perceived damaging short-comings.

The report begins with the following opening paragraph: “The Swedish chemist Svante Arrhenius, winner of the 1905 Nobel Prize for Chemistry, was the first scientist to develop a quantitative relationship between the increase in atmospheric carbon dioxide and global surface temperature. In 1895 he gave a paper to the Stockholm Physical Society on ‘The influence of carbonic acid in the air upon the temperature of the ground’. But this father of anthropogenic global warming theory (AGW) also understood, as should anybody who has ever taken high school biology, that carbon dioxide is plant food and essential to life on earth. From this insight, he deduced that an increase in atmospheric carbon dioxide concentration would benefit mankind by enhancing the growth of plants.”

As Mr. Goklany then explains, anyone who actually repeated Dr. Arrhenius’ conclusion today would be labeled a “science denier.” The use of the term “denier” as it relates to climate change has recently been ruled offside by the *Associated Press* that sets most of the editorial guidelines used by the media. The AP says that “deniers” or “skeptics” with respect to climate change should not be used but rather those people should be referred to as “climate change doubters” or “those who reject mainstream climate science.” It is hard to imagine climate change activists agreeing to that language change.

The problem according to Mr. Goklany is with the “climate change believers.” He sees them embracing the first conclusion of Dr. Arrhenius’ research but ignoring the second. It is this second conclusion that Mr. Goklany’s report focuses on. As he points out, both satellite and ground-based data confirm that the biosphere’s productivity has increased in both managed ecosystems, including agriculture and managed forests, and in unmanaged or natural ecosystems. The science is clear that higher carbon dioxide (CO₂) increases the rates of plant growth, improves the efficiency with which plants use water, increases their drought resistance, and possibly increases crop resistance to pests and weeds. Increased crop yields feed a larger population and limit the need to convert existing habitat to farming. According to the research, the increase in crop yields has meant 11%-17% reduction in the loss of habitat that would have otherwise occurred.

The earth is greener. Terrestrial ecosystems’ productivity is up 14% since 1982. Even the IPCC has acknowledged that productivity is 5% greater than that experienced during pre-industrial times. What this has meant is a significant increase in human well-being. This improvement has come despite an increase in CO₂ in the atmosphere from three million tons in 1750 to 9.5 billion tons in 2011. As Mr. Goklany shows in three charts, the earth’s population

Exhibit 9. Even Sahara Desert Is Showing Green Shoots!

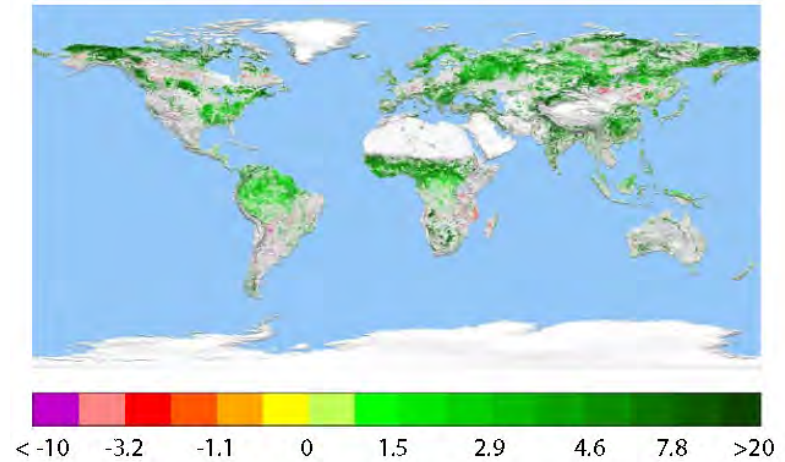


Figure 2: Greening of the Earth, 1982–2011

Trends in gross annual productivity per decade in percentage terms.
 Source: Zhu & Myneni 2014

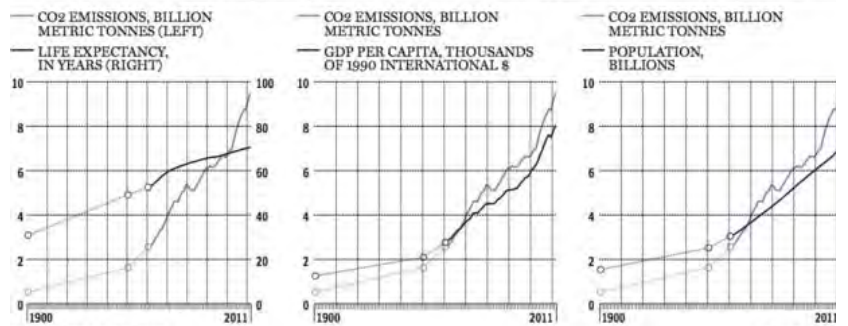
Source: GWPF

Average life expectancy has more than doubled during the time, going from 26 years in 1750 to 31 years in 1900 and 71 years in 2013

has increased nine-fold, having grown from 800 million inhabitants in 1750 to 1.6 billion in 1990 and to 7.3 billion by 2014. The population growth has occurred while average gross domestic production per capita has increased 13-fold from \$650 in 1750 to \$1,261 in 1900 and \$8,500 in 2014, all measured in 1990 International dollars. Average life expectancy has more than doubled during the time, going from 26 years in 1750 to 31 years in 1900 and 71 years in 2013.

Exhibit 10. Carbon’s Contribution To Improved Well-being

LIFE EXPECTANCY, GDP, POPULATION RISE WITH CARBON EMISSIONS



SOURCE: INDUJ M. GOKLANY
 Source: GWPF

The report also focuses on the reason why many of the damage claims made by climate change believers have failed to materialize. The author blames it on the issue of chained climate models that are un-validated, thus increasing the uncertainly level of the final conclusions. One of the major failings of the climate change

movement is the poor performance of climate models that continually overestimate the rise in global temperatures. The report contained a chart showing average global temperature increases predicted by climate computer models compared to actual global surface temperature measurements. Their predictions are poor.

Exhibit 11. IPCC Shows Failure Of Its Climate Model Forecasts

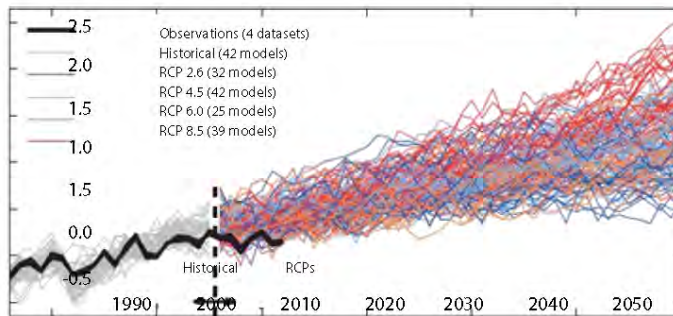


Figure 5: Models versus reality: global surface temperature anomaly
 Figures in degrees centigrade. The observations are land-based measurements, 1986–2012. Source: IPCC, AR5 WG1 (2013), p. 1011.

Source: IPCC

The inability of computer models to accurately reconstruct the past temperature history remains a key failing jeopardizing the validity of their forecasts

One of the key climate change debates relates to the warming of the planet. There have been numerous claims about how fast it is warming. The problem is that while temperatures may be increasing, as they have throughout history, the pace of the warming remains in doubt along with the cause of the warming. The inability of computer models to accurately reconstruct the past temperature history remains a key failing jeopardizing the validity of their forecasts when that output is used to drive government policies to alter economies and human lifestyle.

Exhibit 12. Computer Model Temperatures Way Off

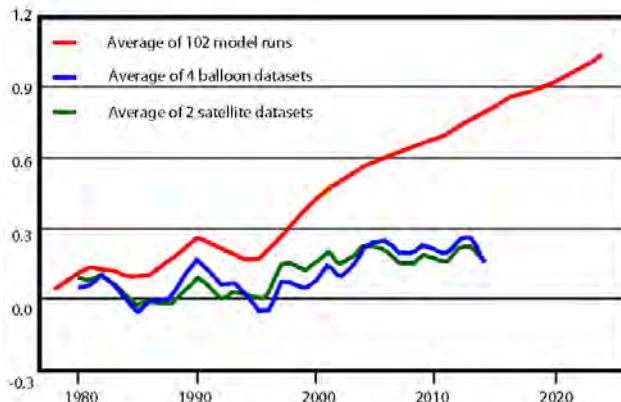


Figure 6: Models versus reality
 5-year averages from models versus satellite and balloon data.
 Source: Redrawn from McNider, Richard, and Christy, John, "Why Kerry is flat wrong on climate change," *Wall Street Journal*, February 19, 2014s.

Source: GWPf

The bigger issue, however, is the one that Mr. Goklany addresses, which is the failure of climate change believers to acknowledge that there are any social benefits from increased CO₂ in the earth's atmosphere

Therein lays the critical issue that climate change rationalists such as Alex Epstein, the author of The Moral Case for Fossil Fuels, and Mr. Goklany focus on in their work – the benefits of carbon for improving living standards throughout the world. The claims that the science behind climate change is settled remain questionable as there are highly-respected climate scientists with peer-reviewed studies who refute many of the new climate change conclusions, and especially the projected outcomes of their policy recommendations. Moreover, if the science were settled, we should be able to replicate the past climate, something that computer models fail miserably to achieve. The bigger issue, however, is the one that Mr. Goklany addresses, i.e., the failure of climate change believers to acknowledge that there are any social benefits from increased CO₂ in the earth's atmosphere. The upcoming Paris climate change conference will be devoid of any opportunity for a rational assessment/debate of global climate policies as the religious hysteria driven by the almighty government-sponsored science-research dollar has tipped the scales in the debate. Until the movement shifts away from its witch-hunting approach to debate, the climate change believers look increasingly like the mobs that over-ran the Bastille during the French Revolution. I'm sure some of the climate change believers would be happy to see the guillotine resurrected in the Place de la Concorde (formerly Place Louis XV and then Place de la Revolution) and used against deniers and doubters. Maybe it is fitting that COP21 is being held in Paris.

Unearthing The Key To Norway's Electric Vehicle Success

Between 2012 and 2014, Norway's EV penetration rate had jumped from 3.1% to 18% while it appeared that financial incentives had not changed

In our last *Musings* we wrote about the problems Germany and Denmark were encountering with their "green energy" programs – primarily the cost. In the discussion about Denmark's status of being the number one green economy within the European Union, along with possessing the highest cost electricity, we focused on the initiatives of the recently elected government. These new bosses have decided to cut back on the financial incentives the prior government was awarding for sources of renewable energy, including the country's electric vehicle (EV) industry. In our analysis, we had two charts showing the relationship between financial incentives granted by countries and the penetration rate of EVs. Between 2012 and 2014 (the years of the two charts), Norway's EV penetration rate had jumped from 3.1% to 18% while it appeared that financial incentives had not changed. We think the 18% figure reflected new car sales and not market penetration as the chart suggested. In our article, we suggested that there must have been other factors at work to explain the jump in EV market penetration.

A few days ago we received an email from a *Musings* reader who offered a number of points to help explain the jump in the Norwegian EV penetration rate. While we won't identify the sender, we will quote his explanation.

“These are the reasons on top of the financial incentive you describe:

- You can drive in the mass transit lane reducing the time to get to and from work very substantially.
- There are toll roads everywhere. Going to the office will cost you \$4 and if you drive any serious distance it can be as much as \$50. But of course serious distance is difficult with an EV. However the toll is zero with an EV. Some places where they just built a bridge or a tunnel out in the rural districts the toll can be \$30 to pas [sic] and zero with an EV.
- Parking on county land is free and often with a charging point at the parking spaces. For others it can be up to say \$2.50 an hour
- The annual tax for owning a car is Zero for EV.
- Repair of ordinary cars is for some reason very expensive. Those with time to spare go to Sweden where it is 30 to 50% lower. EV have very little service costs.

“So all together it is a pretty strong incentive package.”

While this is an excellent listing of the various incentives Norwegians have for owning an EV, other than the first and last, we would place them under the heading of financial incentives. However, the reader's email prompted us to look a little closer at the EV situation in Norway; how it has evolved and its current status.

The government of Norway, considered to be the number one country for EVs, has announced that it is looking at whether to continue the financial incentive program due to its cost to the state's treasury

That latter issue became the prime focus as we started digging into the EV market in Norway. The government of Norway, considered to be the number one country for EVs, has announced that it is looking at whether to continue the financial incentive program due to its cost to the state's treasury, especially when government revenues are being negatively impacted by low oil prices. The struggle will be over the question of whether ending, or severely restricting, the financial incentive program, known as the Zero Emission Vehicle Financial Incentive Program, will kill the growth of EVs in Norway's auto fleet, and whether that is a desirable outcome.

According to reports, Norway's government lost between three billion and four billion NOK (\$370 million to \$494 million) in expected revenue in 2014, and potentially an even greater amount in 2015 and future years. According to figures from Norway's Ministry of Finance about its fiscal 2015 budget, total government revenues are projected to be 989.6 billion NOK (\$122.2 billion) with 47.3 billion NOK (\$5.8 billion) coming from duties on cars and petrol, etc. The

The estimated lost revenues from strong EV sales in 2014 would not appear to be a significant loss, but cumulatively the government is looking at measurable losses

government expects to collect 256.2 billion NOK (\$31.6 billion) from its VAT (value added tax), which is also levied on new car purchases. Oil and gas operations in the Norwegian sector of the North Sea are projected to contribute 342.0 billion NOK (\$42.2 billion) toward the budget, or nearly a third of total government revenues. So, the estimated lost revenues from strong EV sales in 2014 would not appear to be a significant loss, but cumulatively the government is looking at measurable losses, especially with oil and gas prices down. We did notice that between FY2014 and FY2015, the government is projecting flat revenues from taxes on petrol and diesel sales, something that would seem unlikely given the rapid penetration of EVs.

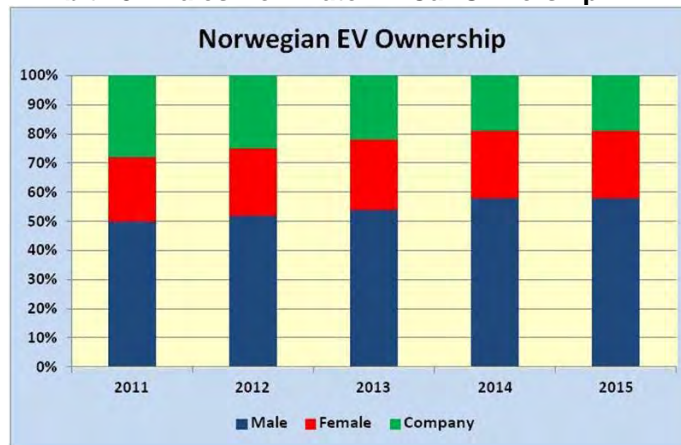
The lost revenues demonstrate what happens when financial incentives are so successful!

In response to the government’s concern about the loss of revenue from high EV sales, the Norwegian Electric Car Association argues that the benefits of the financial incentive program need to be maintained longer as only about 2% of the nation’s fleet is represented by EVs and the economic and social benefits have yet to be truly realized. They believe that continuing the financial incentive program will yield greater benefits for the country down the road. The lost revenues demonstrate what happens when financial incentives are so successful! This is true for any government program with lucrative incentives designed to alter social attitudes.

During the 1994 Lillehammer Winter Olympics, PIVCO, which later became Think, successfully operated 12 EVs

So how did Norway become so EV-successful? According to a history of Norway’s EV industry, in 1989 an entrepreneur and a popular rock band collaborated to promote the value of battery electric vehicles (BEVs). The following year, the government temporarily suspended the import tax on EVs, which was subsequently made permanent in 1996. During the 1994 Lillehammer Winter Olympics, PIVCO, which later became Think, successfully operated 12 EVs. In 1996, the country’s annual car registration fee was reduced for EVs and the following year they were exempted from road taxes.

Exhibit 13. Males Dominate EV Car Ownership

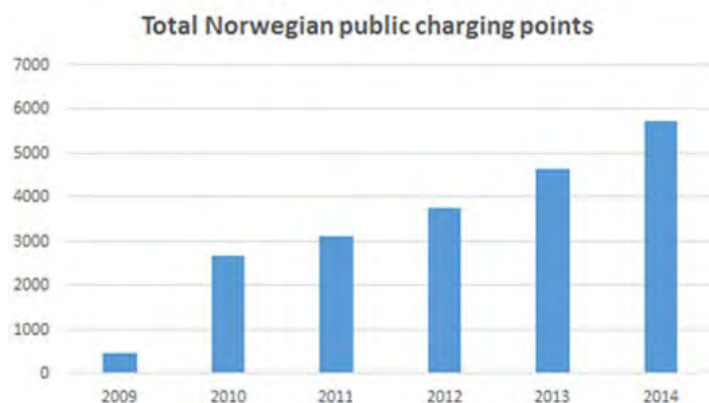


Source: EV Norway

In 2011, the first fast-charging station was opened, and by the following year Norway had 10,000 EVs operating in the country

In 1999, EVs were allowed to park in public spaces without having to pay parking fees. In 2000, the company car tax was reduced for EVs and the following year they were exempted from the VAT. The push for EVs was further enhanced in 2003 when they were allowed to drive in the bus lanes in the Oslo region, which was a change made permanent and extended nationwide in 2006. The following year Oslo launched a municipal EV charging infrastructure program. Three years later Norway launched a seven million euro (\$7.9 million) infrastructure charging program that was designed to see that 1,900 charging points were in place across the country by 2011. In 2011, the first fast-charging station was opened, and by the following year Norway had 10,000 EVs operating in the country. EV sales represented 3% of total auto sales in Norway in 2012. That year a consensus political decision was made to keep the Zero Emission Vehicle (ZEM) financial incentives in place until at least 2018, or until there were 50,000 ZEMs on the road.

Exhibit 14. Locations For Where To Power EVs Growing



Source: EV Norway

The surprise came in mid-April when the 50,000th EV was registered, nearly two years ahead of Norway’s projection that this target would be reached in 2017

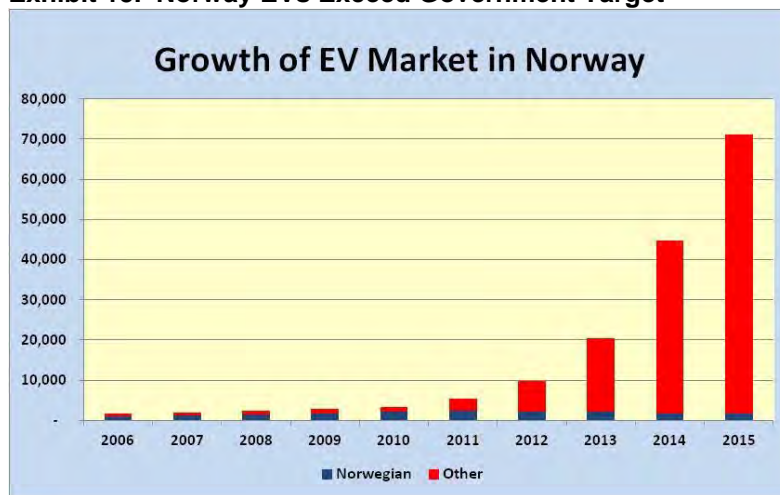
The surprise came in mid-April when the 50,000th EV was registered, nearly two years ahead of Norway’s projection that this target would be reached in 2017. The Norwegian government began to add up the financial cost of the EV financial incentives and it began to hear from their bus drivers. According to one interview, Oslo bus driver Erik Haugstad said, “I’m a bus driver and I want to transport my passengers as quickly as possible. So, I’d like electric cars to leave the bus lanes, where they’re getting in my way. These delays have a cost for society. Time lost by thousands of our passengers in traffic is far greater than that gained by a few dozen electric car drivers.”

Mr. Haugstad said that EVs can create a challenge as bus riders, tired of being caught in traffic could be tempted to buy an EV themselves, thus making the congestion that much worse. Besides that possibility, the government was surprised at the success of Tesla (TSLA-NYSE) S sedans in Norway. The Tesla Model S set a Norwegian sales record in March 2014 for selling the most units of a

A comparably-priced luxury car is about twice the cost of a Tesla Model S

particular model during a one-month period in the country's history. The shock is that the Tesla sells for about 60,000 euros (\$68,100), and isn't necessarily restricted to the super-wealthy. Because the Tesla S is considered a luxury car, the problem for the government comes from the relative taxation of luxury cars. Similar luxury cars powered by internal combustion engines are subject to sales taxes and VAT. As a result, a comparably-priced luxury car is about twice the cost of a Tesla Model S.

Exhibit 15. Norway EVs Exceed Government Target



Source: EV Norway

Demand is helped by the fact that Norway is a small country with concentrated population centers making range-limited EVs feasible

Given both the initial cost and the ongoing annual taxes, the operational flexibility accorded to EVs helps explain why their ownership and use is exploding in Norway. If you refer to Exhibit 15, the rapid growth in EVs, especially from outside of Norway, is tied to the firm commitment to keep the financial incentives for EV purchases in place until 2018 as non-EV luxury cars wind up costing about half of similar gasoline- and diesel-powered vehicles. Added to the cost advantage is the attraction of free parking, bus lane use and, as our *Musings* reader suggested, cheaper repair and maintenance costs. It is no wonder Norwegians are buying EVs. Demand is helped by the fact that Norway is a small country with concentrated population centers making range-limited EVs feasible. More importantly for Norway, it derives nearly 100% of its power from hydropower. Therefore, the shift to EVs should result in a noticeable reduction in greenhouse gas emissions helping the country meet its emissions target of reducing them by at least 40% by 2030 compared to the 1990 level.

American Drivers Are Spending Money Saved At Gas Pump

A recent analysis of consumer credit card spending shows that American drivers are spending the majority of the money they are saving at the gasoline pump. The study, conducted by the new JP

The study did not violate any privacy issues as all personal data and identifying information was scrubbed from the Chase data before it was analyzed

Morgan Chase Institute (JPM-NYSE) seems to refute the information about consumer spending that came from past surveys. The Institute based its study by examining the monthly spending patterns of 25 million individuals who purchase gasoline on their Chase credit or debit cards. The head of the Institute was quick to state that the study did not violate any privacy issues as all personal data and identifying information was scrubbed from the Chase data before it was analyzed.

For every less dollar spent for gasoline, individuals spent roughly 80 cents on other things

According to the study, for every less dollar spent for gasoline, individuals spent roughly 80 cents on other things. Approximately 30% of the savings were spent on food – 20% at restaurants and 10% for groceries. There were also significant gains in spending at department stores and on entertainment and electronics. This spending pattern is in sharp contrast to the consumer survey data showing that households were stashing much of their windfall from lower gasoline prices in the bank or that they were using it to repay debt. These surveys conveyed the view that consumers were still very cautious about their spending nearly six years after the financial crisis and recession.

Any sharp rise in gasoline pump prices could have a negative impact on overall consumer spending and the health of the economy

If the Institute's analysis is correct that very little of consumer savings at the gas pump is being saved, then any sharp rise in gasoline pump prices could have a negative impact on overall consumer spending and the health of the economy. The Institute concluded that individuals in the lowest income quintile received the largest benefit from lower gasoline prices. This segment received the savings equivalent to 1.6% of their monthly income, while middle-income individuals saved just over 1%. The top quintile for income saved more from lower pump prices in absolute terms but their overall benefit was just 0.5%.

Besides a disparate income benefit, there were also regional differences. People living in the South and Midwest benefitted the most from lower gasoline pump prices, while those in the East and West were found to be "lower impact states" because people there use less fuel. We found this conclusion somewhat surprising given the automobile culture of California and the longer driving distances encountered by travelers and residents in many western states.

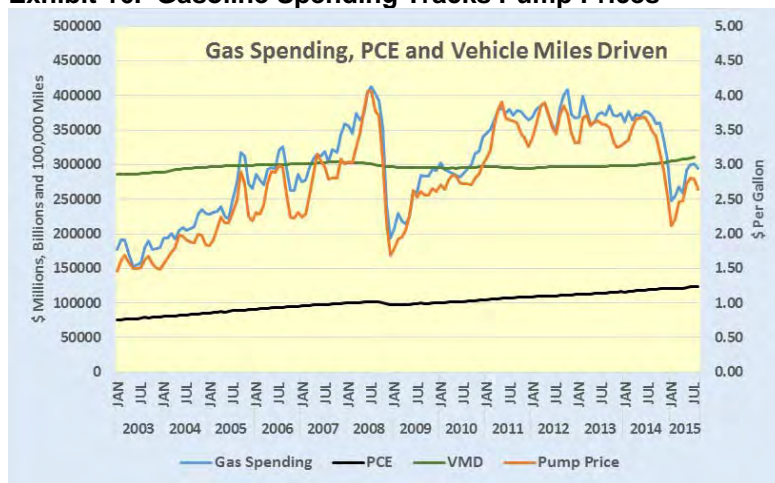
Comparing this August with the same month in 2014, personal consumption expenditures increased by 3.5% while gasoline spending fell by 19.8%

We decided to look at some trends in consumer spending and for gasoline compared to overall spending and vehicle miles driven. The latest spending data from the U.S. government is for the month of August. Comparing this August with the same month in 2014, personal consumption expenditures increased by 3.5% while gasoline spending fell by 19.8%. In absolute numbers, personal consumption expenditures increased by \$422,199 million over the last 12 months while gasoline spending fell by \$75,610 million. When we consider vehicle miles driven, based on July 2014 to July 2015 (latest data available) the increase was 3.2%, or 96 billion miles driven. We know the domestic automobile industry has been

Cheap gasoline pump prices have encouraged vehicle buyers to opt for sport utility vehicles (SUVs), cross-over vehicles and pickup trucks, all with lower fuel-efficiency ratings compared to sedans

selling cars at annualized monthly rates of somewhere between 17.5 million and 18 million units. Without knowing what is happening to vehicle scrapping, it is likely the overall American vehicle fleet is expanding. The University of Michigan, which tracks the monthly fuel-efficiency of new car sales, has reported that fuel-efficiency has declined, based on mile per gallon ratings posted on the windshields of vehicles sold. In other words, cheap gasoline pump prices have encouraged vehicle buyers to opt for sport utility vehicles (SUVs), cross-over vehicles and pickup trucks, all with lower fuel-efficiency ratings compared to sedans.

Exhibit 16. Gasoline Spending Tracks Pump Prices



Source: BEA, EIA, DOT, PPHB

It was amazing how closely consumer gasoline expenditures track the price at the pump

When all of our data was plotted (after adjustments to PCE and VMD data to enable them to fit on the same graph) it was amazing how closely consumer gasoline expenditures track the price at the pump, which would suggest that VMD has little impact on the total. While it is difficult to see, an examination of the PCE data shows almost a continuous rise over the 2003-2015 period except for the 2008-2009 financial crisis and recession months.

The steady increase in VMD suggests that the assumption that the American car culture was dead may have been a premature conclusion

Again, while it is difficult to see, there is a very gradual rise in VMD up until 2007 at which point Americans seemed to fall out of love with their automobiles. That slump lasted until about a year ago as the economy steadily improved and gasoline pump prices began dropping. The steady increase in VMD suggests that the assumption that the American car culture was dead may have been a premature conclusion. It will be interesting to see what happens to consumer spending, automobile buying and American driving habits when gasoline pump prices rebound. In the interim, the oil business should be thankful that the automobile culture hasn't died, yet.

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