

MUSINGS FROM THE OIL PATCH

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Note: *Musings from the Oil Patch* reflects an eclectic collection of stories and analyses dealing with issues and developments within the energy industry that I feel have potentially significant implications for executives operating oilfield service companies. The newsletter currently anticipates a semi-monthly publishing schedule, but periodically the event and news flow may dictate a more frequent schedule. As always, I welcome your comments and observations. Allen Brooks

Energy Stocks Hammered: Profit-taking or Weak Demand?

Equity markets have sharply corrected in response to these credit problems

These financial cross-currents has been increased pressure to sell profitable or highly liquid investments in order to address the margin calls

Stock markets have been pummeled over the past two weeks as a global credit crunch has evolved from the problems in the U.S. sub-prime mortgage debt market. Globally, equity markets have sharply corrected in response to these credit problems. Another financial stress point has been the currency market. The U.S. dollar has been falling against most major currencies such as the British pound, the Euro and the Japanese yen. An aggressive financial game that may be coming to an end is the yen carry-trade.

For the past five years, investors have been able to sell short the Japanese currency that was significantly undervalued relative to the currencies of a handful of other countries whereby investments in those countries could earn substantially higher returns than the cost to borrow the funds necessary to support their yen short-position. As the yen recently has increased in value relative to the U.S. dollar and the other strong currencies, these aggressive investors have been forced to repurchase the yen to close out their short-positions, and as a result they have had to sell the assets they acquired with the proceeds from their yen short-positions. In many cases these assets cannot be properly valued or are temporarily illiquid. The net result of these financial cross-currents has been increased pressure to sell profitable or highly liquid investments in order to address the margin calls on these leveraged speculative transactions. This is partly responsible for the dumping of crude oil contracts and energy stocks.

The damage in the energy market from this chaos is shown by Exhibit 1. We have plotted the year-to-date performance of the Philadelphia Oil Service Index (OSX) and the AMEX Oil Index (XOI), as broadly representative of energy stocks, and the Dow

Jones Industrial Index (DJIA) to reflect the market. The DJIA peaked in mid July at over 14,000, and had generated about a 12% year-to-date performance.

Exhibit 1. Energy Stocks Have Fallen Hard During Correction



Source: BigCharts.com, PPHB

The peak in crude oil prices coincided with the XOJ's peak

This market's gain came despite a rise in crude oil prices to an all-time record high of \$78 per barrel in mid July. But notice that the peak in crude oil prices coincided with the XOJ's peak.

What was interesting is that during late June to early July, as crude oil prices climbed to their peak, the performance of the XOJ increased by over 50%, from a YTD gain of about 17% to a gain of 27%. During this same time period, the OSX trailed significantly in performance by only rising from a 30% gain to about a 38% TYD gain. Oil service stocks, however, continued rising after the peak and subsequent decline in oil prices as the better-than-expected second quarter earnings reports from most of the oil service companies, combined with the prospect for accelerating petroleum industry capital spending, boosted the stocks' investment attractiveness. Year-to-date performance for the OSX peaked out at about a 42% to 43% gain as we began the second half of July.

Growth in energy demand would be at risk if the current stock market turmoil signals greater economic problems ahead

While crude oil futures contracts and the stocks of oil and oil service companies were being dumped in recent days, investment prospects for the industry were only marginally altered. There is little doubt that the growth in energy demand would be at risk if the current stock market turmoil signals greater economic problems ahead. Most economic forecasters seem committed to their current estimates that U.S. economic growth will accelerate in the second half of 2007 to about 2.5-2.75% versus the first half growth of about 2.0%. At the moment, European economic growth seems to be ramping up, and certainly China's growth remains in high gear with its second quarter GDP growth reported in excess of 11%.

The current stock market turmoil is forcing some forecasters to rethink their view of future economic growth, however. In a new

Merrill Lynch foresees a consumer recession for the first time in 17 years

report issued by Merrill Lynch (ML-NYSE), the firm reduced its U.S. 2008 economic growth forecast to 1.5% from 2.3%. It also foresees a consumer recession for the first time in 17 years. If slower growth is more likely than estimates of future energy demand growth will fall. This prospect may be behind some of the selling of energy stocks, besides the need for investors to sell investments to meet liquidity needs.

A slowdown could also provide the opportunity, as stock valuations contract, for merger and acquisition activity to pick up

Even with a slowing in economic growth, the underlying health of the energy industry is certainly positive. Company balance sheets are about the strongest they have been since possibly the late 1960s. That doesn't mean some companies cannot find themselves in financial trouble if they do not manage their business prudently. However, the low nominal and net-debt levels on balance sheets should minimize financial damage. The big question is whether an industry slowdown could be a catalyst for older managements to elect to cash out and sell their businesses. A slowdown could also provide the opportunity, as stock valuations contract, for merger and acquisition activity to pick up, resulting in a major restructuring of the industry. We do live in interesting times. Who will seize the opportunities that evolve to significantly expand their franchises? And which managements will be heading for the door? Stay tuned. The next six to 18 months will be an interesting time for the energy business.

Climate Change: A Thoughtful and Non-dogmatic Book

It is possible that natural cycles play an important role besides humans in the global warming trend

We have been following and commenting on the ongoing debate – both scientific and political – about the global climate change issue. We are convinced that the globe has been warming; the temperature data appears incontrovertible, although recent developments cast some doubts. (See NASA story on page 9.) However, we are not totally convinced that humans are the primary cause of the increase in temperatures due to actions that have raised the amount of carbon dioxide (CO₂) in the atmosphere. In other words, it is possible that natural cycles play an important role besides humans in the global warming trend. This is clearly a heretical view, at least as viewed by the proponents of global warming who totally discount natural causes.

Our position does not mean that we have a closed mind about the issue. Moreover, we can make a very strong case that failing to take some actions to reduce the emissions of CO₂ into the atmosphere is foolhardy and certainly not in the best long-term interests of both the existing population and future generations. On the other hand, we believe some of the draconian proposals for controlling economic and social activities in the future to achieve a cleaner environment may be tied to undisclosed social, economic and political agendas.

The people pushing these proposals with hidden agendas always want to classify anyone who questions them as 'global warming deniers.' That may be starting to change as they are trying to

**Plows, Plaques & Petroleum
presents an interesting global
warming thesis in a non-dogmatic
manner**

convince the public that the issue is no longer global warming but climate change, which enables them to point to every unusual weather feature as support of their thesis.

In trying to better understand the global warming issue and what may be behind the trend, we recently read a very interesting and, in our opinion, balanced book on the subject. Plows, Plaques & Petroleum: How Humans Took Control of Climate by William F. Ruddiman (Princeton University Press, 2005) presents an interesting thesis in a non-dogmatic manner by a long-time climate scientist. Dr. Ruddiman recently retired as Professor of Environmental Sciences at the University of Virginia. He was previously for many years a Doherty Senior Research Scientist at Lamont-Doherty Earth Observatory of Columbia University.

Dr. Ruddiman's thesis is that humans have been changing the climate of the planet for some 8,000 years as a result of their earlier discovery of agriculture. The associated deforestation of the globe in order to turn more land into tillable acreage is behind the theory. Dr. Ruddiman believes that there have been three broad stages of human history: 1) when nature was in control of the climate; 2) when humans began to take control – discovering agriculture and affecting climate through CO₂ and methane emissions; and 3) the more recent human impact on climate change.

In dividing climate history into three periods, Dr. Ruddiman identified the period prior to 8,000 years ago as Phase I, when there were few humans and they moved frequently. They did use fires for clearing areas to raise food, but mostly they moved with the weather. As a result their environmental footprint was small and regionalized. Nature was in control, dominated by the ice sheets that were reduced in size so they had little cooling impact on the planet, while solar radiation warmed the climate.

**In Phase II, deforestation
gradually spread and the burning
of trees further added CO₂ to the
atmosphere**

From 8,000 to 200 years ago was Phase II, when humans cleared forests in southern Europe and northern China to make way for agriculture. Deforestation gradually spread and the burning of trees further added CO₂ to the atmosphere. The use of irrigation in the lowlands of Southeast Asia further added methane, an important greenhouse gas, to the atmosphere.

Phase III began 200 years ago and is likely to continue for another 200 to 300 years. This is the industrialization period when deforestation increased to provide fuel for mills and mining operations and for more farmland. Increasing populations in tropical areas characterized the period. As a result, the global climate warmed by 0.6° C to 0.7° C during the last 100 years. Greenhouse gases levels are above natural levels but the global temperature level has not yet exceeded levels reached during previous interglaciations of the last several hundred thousand years. Northern Hemisphere solar radiation has moved toward minimal levels. The climatic system, assisted by the industrial emissions of sulfate aerosols has canceled part of the warming that greenhouse

gases would otherwise have caused.

After studying the historical data on greenhouse gases in the atmosphere, Dr. Ruddiman noted that the impact of farming on greenhouse gas levels, thousands of years before the industrial revolution, appeared to keep the planet notably warmer than if natural climate cycles had prevailed – quite possibly forestalling a new ice age. But what was of even greater interest to Dr. Ruddiman was trying to explain variations in greenhouse gases in the past 2,000 years, which didn't fit the theories of human impact.

Dr. Ruddiman seizes on the old Peter Falk character on the television mystery show, *Columbo*, to help explain how he approached his analysis. In those shows, in an early scene as the detective was just beginning to investigate a recently committed crime, Mr. Falk would have a conversation with the character he would eventually accuse of the crime. As he finishes and is halfway out of the room, Mr. Flak would stop, turn back, scratch his head and say; "There's just this *one* thing that's bothering me...." And so it began with Dr. Ruddiman's analysis.

His first *Columbo* moment, followed by others that prompted Dr. Ruddiman's investigations, was trying to understand why there was an anomalous rise in methane in the atmosphere that began about 5,000 years ago when everything about natural climate cycles said it should be going down. After investigating, he found that just about the time the methane trend began to rise, humans started to irrigate in order to grow rice in Southeast Asia. The irrigation created unnatural wetlands that emitted methane and thus explained the anomaly. But then Dr. Ruddiman needed to explain other mysteries: the cause of a similarly anomalous rise in atmospheric CO₂ in the last 8,000 years; the reason why new ice sheets have failed to appear in northeast Canada when the natural cycles of the Earth's orbit predict that they should have; and the origin of brief drops in CO₂ that again cannot be easily explained by natural processes.

The scientific data suggests a trend in the rise of CO₂ over the past 10,000 years. However, the rise in CO₂ values slows in the last 2,000 years compared to the previous 8,000 years. This seems strange given the growth in human population and technological improvements. So why haven't CO₂ values risen even faster? Additionally, the rise in CO₂ values oscillated during the period with wiggles much greater than can be explained by possible measurement errors, so one must assume that these variations are real. The wiggles happened both when Northern Hemisphere ice sheets were large and when they were absent from North America and Europe. Dr. Ruddiman believed that there were two possible explanations: sporadic volcanic explosions that would put dust in the atmosphere blocking the sun and small changes in the brightness of the sun. The problem with these explanations is that they did not explain the large dips in CO₂ during the last 2,000 years.

Dr. Ruddiman concluded that there had to be another explanation,

He found that just about the time the methane trend began to rise, humans started to irrigate in order to grow rice in Southeast Asia

The rise in CO₂ values slows in the last 2,000 years compared to the previous 8,000 years

Throughout history, whenever pandemics developed, they wiped out between 25% and 40% of the population and they coincided with declines in CO₂ values

i.e., another *Columbo* ‘one thing that’s bothering me’ moment. While contemplating the issue, Dr. Ruddiman came across a literary reference to the Four Horsemen of the Apocalypse: War; Famine; Pestilence; and Death. So he began to investigate them as a possible explanation for the drops in CO₂. He looked at the history of wars during the period and they didn’t explain the wiggles. Neither did famine. But plagues did fit the pattern. Throughout history, whenever pandemics developed, they wiped out between 25% and 40% of the population and they coincided with declines in CO₂ values. The elimination of such large segments of the population reduced the need for as much agriculture. In turn, this contributed to reforestation of areas that had previously been reclaimed for agriculture. The drop in agriculture also meant a reduction in the number of animals kept and a reduction in rice-growing in wetlands, both of which result in lower amounts of methane being released into the atmosphere.

Whether, or not, one believes Dr. Ruddiman’s explanation for global warming and the role of humans, his thesis is provocative. Will the likely correction to the current global warming phenomenon be a future pandemic? If so, this gives the periodic news reports about possible bird flu epidemics, growing malaria outbreaks or continuing AIDS problems real substance and something that should be monitored. On the other hand, maybe the planet will confront another malady we are not prepared for that will devastate the global population. Should that happen, expect energy demand to fall, easing CO₂ emissions.

He talks about the role of the media in spreading fear based on news reports and photos, which are often wrong in their depiction

The other aspect of Dr. Ruddiman’s book that we found interesting was his take on the media hysteria surrounding the global warming issue. He talks about the role of the media in spreading fear based on news reports and photos, which are often wrong in their depiction of the situation, but definitely attention getters.

He cited the recent spectacular photos of Antarctic ice sheets breaking off and the fear that their “melting” will raise the sea level and flood low lying areas of the world. As he points out, correctly, ice in water is irrelevant to the sea level since the floating ice has already raised the sea level. In using these photos without explaining that this is a natural process and won’t flood the world, he believes the media is doing a huge disservice to the issues that need to be addressed in a rational manner. At the end of the day, the issues are: What are the solutions to global warming and can society really afford them? As he put it:

Draconian economic sacrifices would have to be enacted that almost everyone would find intolerable

“...unspoken truth about global warming that for some reason politicians of both parties ignore. To reduce current and future greenhouse-gas emissions to levels that would avoid most of the projected future warming, draconian economic sacrifices would have to be enacted that almost everyone would find intolerable: much more expensive fuel for travel and heating, much lower/higher thermostat settings in houses and workplaces, and extremely costly upgrades (or total replacements) of power plants.

“...I do not rank the oncoming global warming as the greatest environmental problem of our time”

“At this time, with current technologies, we simply cannot afford the effort that would be required to mitigate the main impact of global warming.”

He points out that we should be more concerned about the media coverage, especially given the reliance by reporters on one-sided scientists. While he directs some of his ire toward those scientists backed by industry, he says that all scientists should disclose who funds their research, which includes advocates for global warming restrictions. While Dr. Ruddiman is concerned about future climate change, he says, “...I do not rank the oncoming global warming as the greatest environmental problem of our time.” He believes more serious concerns should be focused on depletion of key resources (oil and gas, water and topsoil), changing ecosystems (cutting trees, filling in wetlands and moving rivers) and the ongoing population explosion. In some ways, Dr. Ruddiman, a climate scientist, is really a closet Malthusian. That philosophy can lead to serious economic and social restrictions that the public may not tolerate. In the mean time, we need to watch for anything that can develop into a pandemic that would lower the globe’s population and alter the direction of our climate.

Summertime Is Time to Stake Your Arctic Land Claim

Little did we know that we would be writing continually about the Arctic land grab currently underway. Usually we treat a topic and move on, possibly revisiting it when new information or a new, interesting angle develops. In this case, the significance of the Arctic land grab has been magnified by the growing focus from professional energy forecasters and politicians about a near-term peaking in global oil supplies.

The Russians are preparing the data gained from this expedition to support a new claim to be presented to the UN

The story of the land grab began with a Russian scientific expedition, headed by a renowned Russian Arctic explorer leading a team of scientists, which dove to the floor of the Arctic Ocean and planted the country’s flag and claimed the territory for its citizens. The Russians, who were earlier turned down in their request to claim more of the Arctic Ocean shelf for their country, are preparing the data gained from this expedition to support a new claim to be presented to the UN committee empowered to resolve land claims offshore under the Law of the Sea Treaty.

The Russian expedition has been followed by a 40-member scientific team, including 10 Danes, which left on August 13 on a research ship following a chartered, powerful Russian icebreaker capable of smashing the up-to-16-foot thick ice. The research ship will be using sophisticated equipment including sonar to map the continental shelf extending from Greenland to the Lomonosov Ridge. This 1,240-mile submerged mountain range is the same land mass the Russians have recently claimed. Helge Sander, the Danish minister of science, technology and innovation, speaking to Danish TV2 said, “The preliminary investigations done so far are

very promising. There are things suggesting that Denmark could be given the North Pole.”

Exhibit 2. Battle Over Lomonosov Ridge Claim



Source: GlobeandMail.com

The United States is at a disadvantage in this global land grab

The announcement of the start of the Danish expedition was followed by a U.S. announcement that it would be sending the Coast Guard Cutter *Healy* on a mission to map the seafloor on the northern Chukchi Cap, an underwater plateau that extends 500 miles northward from Alaska’s North Slope. Clearly, the United States is at a disadvantage in this global land grab because it is not a signatory to the UN Law of the Sea Treaty, something President George W, Bush is trying to convince the Congress to remedy.

Canada announced plans to build an army training center for 100 troops in Resolute Bay along with a deepwater port on Baffin Island

With all this activity from neighboring Arctic Ocean countries, Canada has accelerated its response. Rather than sending scientists, although there are some Canadians on the Danish expedition, the country elected to send its prime minister, Stephen Harper, on a three-day trip to the far north region of the country to announce concrete plans to expand Canada’s presence in the area. Prime Minister Harper announced plans to build an army training center for 100 troops in Resolute Bay along with a deepwater port on Baffin Island. While on his trip, Prime Minister Harper added plans for a second deepwater port. So the question is: Will sending a high government official to the Arctic region trump the planting of a flag on the seabed by scientists?

There are estimates that the Arctic Ocean contains as much as 25% of the world’s undiscovered oil and gas. According to energy

Arctic basins, including areas already in production, contain about 233 billion boe and another 166 billion boe yet to be found

research firm, Wood Mackenzie, the Arctic basins, including areas already in production such as Prudhoe Bay in Alaska, contain about 233 billion barrels of oil equivalent (boe). It also believes there are another 166 billion boe yet to be found. The U.S. Geological Survey plans as soon as next year to assess the Arctic region's oil and gas resource potential.

Huge potential impact for shipping from a year-round Northwest Passage

While oil and gas and other natural resources remain the primary motivator behind the land grab, there is still the huge potential impact for shipping from a year-round Northwest Passage. This potential was highlighted by the report from the National Snow and Ice Data Center, affiliated with the University of Colorado's Cooperative Institute for Research in Environmental Sciences, which reported there was less sea ice in the Arctic last Friday than ever before on record. A ship traveling at 21 knots per hour between Rotterdam in the Netherlands and Yokohama, Japan, takes 29 days if it goes via the Cape of Good Hope, 22 days via the Suez Canal and just 15 days if it goes across the Arctic Ocean. Estimates are that 90% of all the goods in the world, measured in tons, are transported by sea. The rapid global economic growth, fueled by China and other Asian countries, is translating into the clogging of existing shipping routes. Container shipments on international routes are increasing annually at between 5% and 7% per year recently, in line with global trade growth, meaning that the volume of container shipments approximately doubles every 10 to 15 years. With the limitations on drafts and widths for ships traversing the Suez and Panama Canals, the larger ships that are coming to dominate ocean trade are being forced to take longer sea routes around Africa and South America. The opening up of a Northwest Passage will help solve the transportation challenges and likely reduce their cost to the benefit of the global economy.

Does NASA Data Change Undercut Climate Analysis?

The NASA U.S. surface temperature data base that underlies much of the science of global warming analysis was found to have a serious error

In the same week that *Newsweek* magazine took on the issue of global warming as a hoax and Al Gore predicted the Earth's future climate would look more like that of Venus if nothing was done to control greenhouse gas emissions, the NASA U.S. surface temperature data base that underlies much of the science of global warming analysis was found to have a serious error. Does this signal a serious issue with the global warming analysis, or is the change a minor issue?

The *Newsweek* article attacked the supposed "global-warming deniers" who have been questioning the underlying science that supports the linkage of human activity to increased global warming. The authors examine the funding issues of those scientists and think tanks that have been questioning the science of global warming. Of course, the global warming/human linkage theorists have been working hard to shift the media and public's focus on the concept of "climate change" rather than global warming. We suspect they are making this shift because it enables them the ability to seize upon

Al Gore argued that the Earth's climate would resemble that of our neighboring planet, Venus

every unusual weather event as a confirmation of the impact of global climate change, even when the issue is cooler temperatures. For example, Houston experienced the wettest July in 113 years, and the coolest July since 1905.

Al Gore, speaking at a conference in Singapore in July (and elsewhere since), argued that the Earth's climate would resemble that of our neighboring planet, Venus, if actions are not taken to control greenhouse gas emissions. His comments at these speaking engagements, along with his writings and a *New York Times* editorial have highlighted the following:

"Consider this tale of two planets. Earth and Venus are almost exactly the same size, and have almost exactly the same amount of carbon. The difference is that most of the carbon on Earth is in the ground - having been deposited there by various forms of life over the last 600 million years - and most of the carbon on Venus is in the atmosphere.

"As a result, while the average temperature on Earth is a pleasant 59 degrees, the average temperature on Venus is 867 degrees. True, Venus is closer to the Sun than we are, but the fault is not in our star; Venus is three times hotter on average than Mercury, which is right next to the Sun. It's the carbon dioxide."

Venus' atmosphere is about 100% CO₂ while the Earth's atmospheric composition is only about 0.00056 of the full mass of one Earth atmosphere

What Al Gore seems to have missed is that Mercury doesn't have a permanent atmosphere as its gravity is too weak to retain one. Any atmospheric elements it has from time to time are captured from the solar wind and trapped temporarily in whatever gravity it has. Venus, closer to the sun and with a slightly weaker gravity than Earth, is unable to retain large quantities of lighter gases in its atmosphere for long periods of time due to water vapor. Lighter gases escape leaving behind larger quantities of heavier gases such as carbon dioxide. As a result, Venus' atmosphere is about 100% CO₂ while the Earth's atmospheric composition is only 0.00056 of the full mass of one Earth atmosphere. In other words, Venus and Earth have almost exactly opposite atmospheric make-ups.

The net impact of the corrected data was to alter the ranking of the top ten warmest years

The science issue is that the surface temperature data base for the United States, collected and analyzed by the Goddard Institute for Space Studies (GISS), run by NASA, and used to support the global warming models trumpeted by James Hansen of NASA as demonstrating the crisis the Earth is facing, was found to have contained data errors since 2000. Canadian researchers, Stephen McIntyre and Ross McKintrick, associated with ClimateAudit.org, uncovered the data errors and brought them to the attention of officials at GISS. While NASA has released a number of press releases during 2007 highlighting the global warming problem, the data revision was released without any announcement, although GISS did acknowledge the error in an email to Mr. McIntyre. The net impact of the corrected data was to alter the ranking of the top ten warmest years, making more of them from earlier periods, especially the 1930s, than from the most recent decade.

Exhibit 3. Revised Temperature Data Alters Warmest Year Rank

New Order of Top 10			Old Order of Top Ten		
Year	Old	New	Year	Old	New
1934	1.23	1.25	1998	1.24	1.23
1998	1.24	1.23	1934	1.23	1.25
1921	1.12	1.15	2006	1.23	1.13
2006	1.23	1.13	1921	1.12	1.15
1931	1.08	1.08	1931	1.08	1.08
1999	0.94	0.93	1999	0.94	0.93
1953	0.91	0.90	1953	0.91	0.90
1990	0.88	0.87	2001	0.90	0.76
1938	0.85	0.86	1990	0.88	0.87
1939	0.84	0.85	1938	0.85	0.86

Source: GISS, PPHB

A group of scientists is openly angry about a government sponsored agency not treating the error with the respect demanded by professional scientific bodies

The scientist who emailed NASA about the data error experienced an attack on his web site, where he had posted the corrected data and an explanation of the correction, that shut it down for days in what is thought to have been undertaken by global warming supporters angry about the discovery. Many of the vocal supporters of the Canadian scientists have come from the conservative media. But a group of scientists is openly angry about a government sponsored agency not treating the error with the respect demanded by professional scientific bodies. The official ethics statement on scientific errors and the need for public correction as adopted by the American Physical Society, the national society of research physics states:

"It should be recognized that honest error is an integral part of the scientific enterprise. It is not unethical to be wrong, provided that errors are promptly acknowledged and corrected when they are detected." (Ethics & Values - 02.2 APS GUIDELINES FOR PROFESSIONAL CONDUCT)

Since the U.S. only accounts for 2% of the Earth's surface so the data revision has a minimal impact on the rising global temperature trend and doesn't alter the crisis we are facing

The much maligned James Hansen, Director of NASA's GISS claims that the critics of its use of bad data are "making a mountain out of a mole hill" since the U.S. only accounts for 2% of the Earth's surface so the data revision has a minimal impact on the rising global temperature trend and doesn't alter the crisis we are facing. He further pointed out that the impact on the global data is one one-thousandths of a percent. However, there are serious questions about the impact on all the temperature data. If there is bad data in the United States, which has the best data collection system in the world, what errors exist in the data from the rest of the world?

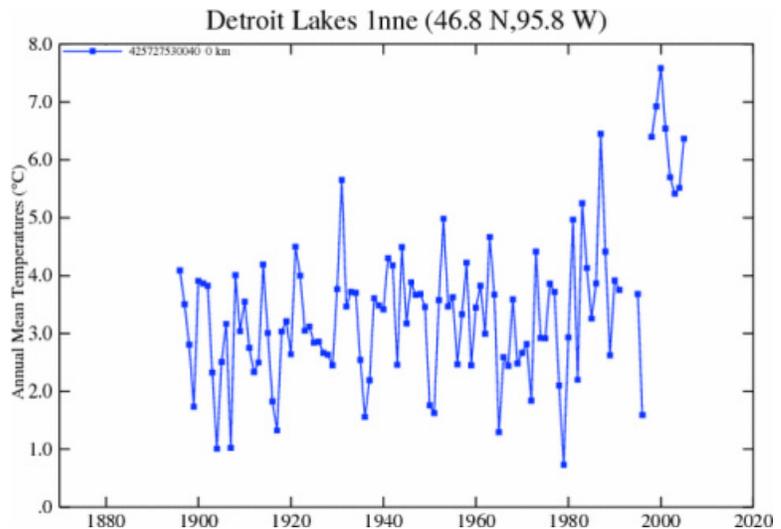
There have been questions raised about the quality of the data. For several years, some data skeptics have suspected that the location of many of the data collection centers has biased the data. They have been engaged in an effort to document the location of all the 1,200 data centers in the United States to ascertain whether the data might be biased. In support of their criticism, they point to several data centers – one in Minnesota where air conditioning units

75% of the data centers had jumps in their temperature data of at least a quarter of a degree Celsius in 2000

were moved adjacent to the collection point at the same time there was a jump in the temperature data. They also have pointed to a data center at the University of Arizona at Tucson that is located in a parking lot where the surrounding concrete can influence the temperature readings.

The data error appears to have been in the correction mechanism to adjust for urban temperature data related to Y2K. An examination of the data showed that 75% of the data centers had jumps in their temperature data of at least a quarter of a degree Celsius in 2000. The graph in Exhibit 4 of the temperature data since 1890 for the Detroit Lakes Inne site, pictured in Exhibit 5 showing the adjacent air conditioners, shows the sudden jump in temperature in that occurred 1999 as the AC units were moved from the roof of the building to their current location next to the temperature collection equipment.

Exhibit 4. Suspect Temperature Data From Minnesota Center



Source: GISS

The U.S. data base accounts for 50% of the observation points that are utilized in the global warming models

The global warming skeptics also point out that further data analysis shows clear data manipulation within this surface temperature data base. Moreover, the U.S. data base accounts for 50% of the observation points that are utilized in the global warming models. This error, which the government has allowed to exist for seven years and for which it still refuses to release the algorithms employed to adjust the raw data measurements, raises serious questions about whether scientific disciplines have been discarded in favor of a political agenda.

Exhibit 5. Location of Minnesota Data Center

Source: Andrew Watts

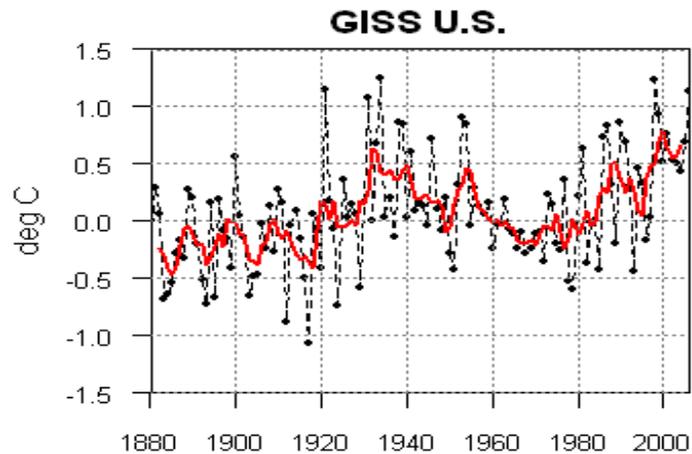
Exhibit 6. Location of Tucson Data Collection Center

Source: Andrew Watts

There is an upward trend in the global curve beginning in the late 1970s, the pattern in U.S. data is quite different

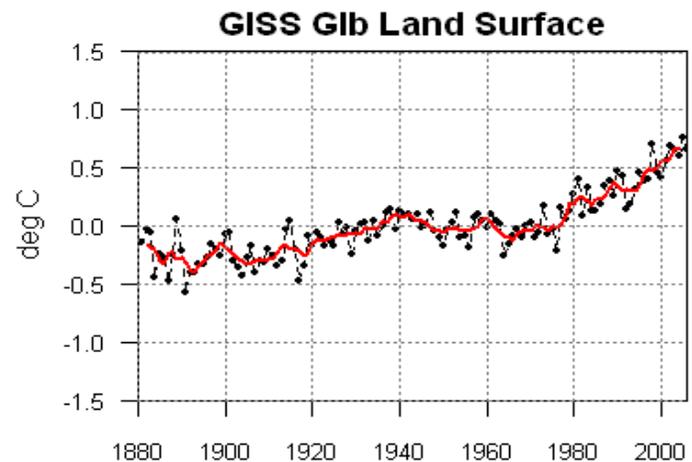
While the revised data produced a reduction in the average temperature change of only 0.15°C , compared to the reported 0.5°C , the change is quite significant. Mr. McIntyre revisited the data for both the United States and globally. What is interesting is that while there is an upward trend in the global curve beginning in the late 1970s, the pattern in U.S. data is quite different. In fact, the data of the 1930s is similar to current data. These graphs raise questions about the validity of the rest of the world data. This may be starting to look like the criticism of the 'hockey stick' temperature model that demonstrated data manipulation to create the pattern. This analysis, which was the prime supporting argument for the UN's 2004 IPCC report, was dropped from the latest report.

Exhibit 7. U.S. Data From 1930s Matches Current Data



Source: GISS, McIntyre

Exhibit 8. Global Data Shows Rising Temperatures

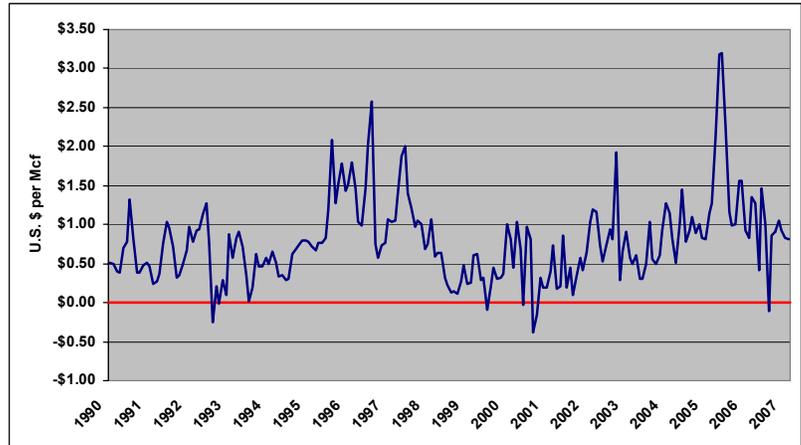


Source: GISS, McIntyre

Canada Oilfield Market Remains in Turmoil

U.S. gas consumption increases have been satisfied by a mix of more domestic production, greater imports of liquefied natural gas (LNG) and growing imports from Canada

Natural gas prices are one of the primary drivers for oilfield activity in Canada as growing exports to the United States and increased domestic consumption associated with greater oil sands production have boosted gas demand. At least for the past decade, U.S. gas consumption increases have been satisfied by a mix of more domestic production, greater imports of liquefied natural gas (LNG) and growing imports from Canada. However, the startup of new oil sands extraction plants that use gas to fuel the process has increased domestic consumption. At the same time, Canadian gas drilling has failed to boost productive capacity as rapidly as production has occurred. As a result, Canadian gas production is struggling to grow.

Exhibit 9. US/Canada Gas Price Spread Is In Normal Range

Source: NEB, PPHB

The level of Canadian gas prices is not particularly high, under \$7 per Mcf

The price of natural gas in Canada has generally trailed the price for gas received on the NYMEX. Due to last year's warm winter in the United States, the January 2007 price spread between Canada gas and NYMEX prices was actually positive due to the winter demand in Canada. However, as summer arrived, Canadian natural gas prices fell back into the more normal negative spread from NYMEX prices. The spread in gas prices is shown in Exhibit 9. While the spread is now in a more normal range, the level of Canadian gas prices is not particularly high, under \$7 per thousand cubic feet (Mcf). The current level of U.S. natural gas prices and the prospect that gas consumption needs are falling short of forecasts due to delays in new oil sands plant startups, increased U.S. domestic gas production and a significant jump in U.S. LNG imports, is depressing Canadian gas price expectations.

While lower than anticipated Canadian gas needs are depressing current gas prices, producers are also struggling with the cost of finding and developing new gas reserves. Canadian oilfield service costs, like those globally, have climbed in recent years. Higher drilling and field activity has pushed the oilfield service industry to virtual full equipment utilization levels. In response to high activity levels, service companies have aggressively built new equipment, both to replace worn out equipment and to boost their capacity. The tight labor market has also forced oil service companies to spend more money on crew training and to boost wages to attract and retain labor.

We have talked to some producers who say that until natural gas prices are above \$8 per Mcf, no new CBM projects are financially viable

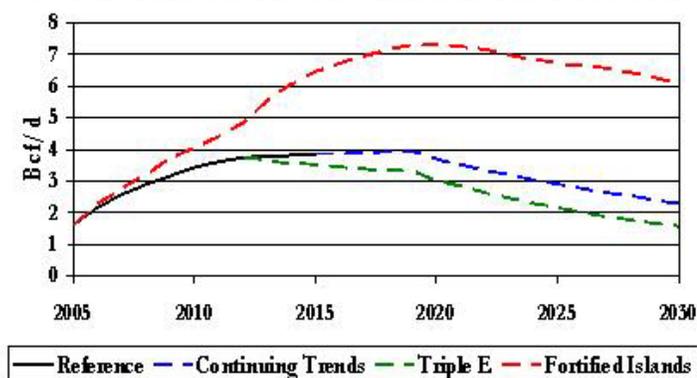
According to Canadian producers, domestic natural gas prices need to be in the \$8 to \$10 per Mcf range to support certain types of drilling activity. Most prominent is coal bed methane (CBM) drilling. We have talked to some producers who say that until natural gas prices are above \$8 per Mcf, no new CBM projects are financially viable. This drilling has been a mainstay of Canadian oilfield activity in recent years as CBM is becoming a more significant factor in Canada's gas supply mix.

The NEB has projected in its reference case that CBM production will grow to 2.0 billion cubic feet per day (Bcf/d) by 2015 and account for half of the country's unconventional gas supply

Canada's National Energy Board (NEB) produces forecasts of the energy supply and demand situation. In its 2006-7 winter energy outlook forecast, the NEB has projected in its reference case that CBM production will grow to 2.0 billion cubic feet per day (Bcf/d) by 2015 and account for half of the country's unconventional gas supply. (See Exhibit 10.) In other scenarios, Continued Trends and Triple E, CBM production grows to 2.4 BCF by 2019. In the Fortified Islands case, in which the Deep Panuke field comes on stream in 2010 and Mackenzie Valley gas production in 2012, \$12 per Mcf gas prices drive CBM production to almost 5 Bcf/d of supply by 2020. But with current natural gas prices sitting below \$7 per Mcf and prospects for them not rising materially before winter, it is likely that the development of CBM reserves and production will fall below the forecast. Until gas prices rise, the CBM market's challenges will put downward pressure on the Canadian oil service industry's financial results for the balance of this year. Longer term, the absence of CBM reserves will act to push up gas prices and boost future oilfield activity. Pay me now; or pay me later – which scenario will win out?

Exhibit 10. CBM To Grow In Canada's Gas Supply

Western Canada Unconventional Gas Production



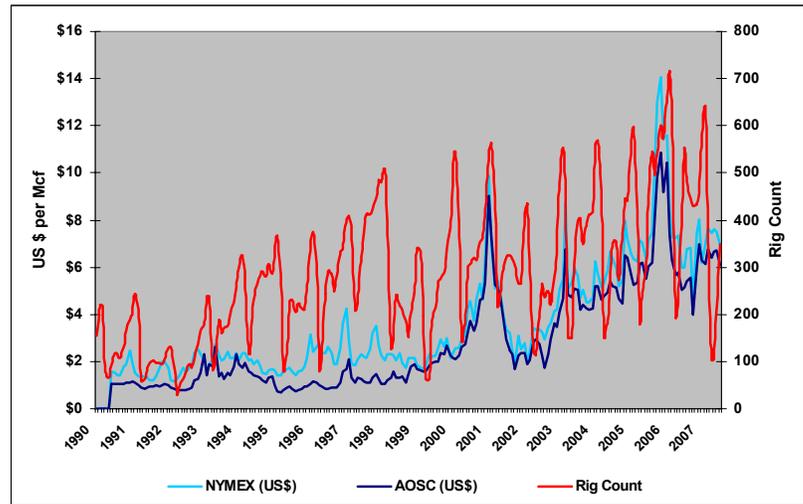
CBM is half of unconventional production



Source: NEB

The Canadian drilling rig count has dropped in recent weeks as natural gas prices are depressed

Earlier this summer, both Canadian oilfield service industry organizations – PSAC (Petroleum Service Association of Canada) and CAODC (Canadian Association of Oilwell Drilling Companies) – lowered their forecasts for drilling activity. These revisions were largely due to weak second quarter activity when an early spring breakup and significant rainy weather depressed drilling. According to drilling rig statistics, fleet utilization in the quarter averaged only 17%, which contributed to significantly depressed financial results for most Canadian oilfield service companies. After rebounding for the first few weeks of the third quarter, the Canadian drilling rig count has dropped in recent weeks as natural gas prices are depressed along with their outlook.

Exhibit 11. Rig Count Is Flagging With Weak Gas Prices

Source: NEB, Baker Hughes, PPHB

The outlook for a recovery in Canadian oilfield activity in the second half of this year is slowly evaporating

As shown in Exhibit 11, the drilling rig count, other than its seasonal dip, has generally followed the trend in natural gas prices. When we look at the first seven months of 2007, the snap back from the spring breakup was not quite as strong as in past years. The bigger problem is that the rig fleet continues to grow contributing to lower utilization rates that make the market more competitive and depress prices and profit margins. As shown in the chart, the spread between NYMEX and Canadian gas prices earlier in the year has essentially disappeared as U.S. gas prices have fallen. The outlook for a recovery in Canadian oilfield activity in the second half of this year is slowly evaporating. If so, then many of the earnings estimates for Canadian oilfield service companies are likely too high. A lackluster 2007 recovery, coupled with a possible warm winter could significantly disrupt this North American oilfield market.

Government and Industry Tackle Energy Needs of Servers

The Environmental Protection Agency (EPA) has recently delivered a final report to Congress detailing the increasing power consumption of computer servers and data centers and how government and the industry can alleviate the problem. The report was mandated by a bill passed by Congress last year. The report focuses on three issues: 1) the problem of rising energy costs in data centers; 2) how data centers can minimize energy consumption; and 3) how the EPA and the industry can develop energy efficiency benchmarks for servers and data centers.

“...not a technology problem at all. It’s really a people problem in many respects”

Andrew Fanara, the head of the EPA Energy Star product development team that authored the report, characterized the problem as “...not a technology problem at all. It’s really a people problem in many respects. It’s a function of what any organization needs to do good planning and implementation of best practices that

Data center server power consumption worldwide had doubled between 2000 and 2005

currently exist.” This report, mandated by legislation, follows from the EPA’s growing interest in data centers and server power needs that began in 2005 largely after learning of the issues from an AMD-sponsored (AMD-NYSE) study on data center server power consumption conducted by a Stanford University professor and a staff scientist at Lawrence Berkeley National Labs. The study showed that data center server power consumption worldwide had doubled between 2000 and 2005, and would increase by a further 75% by 2010 if present trends remained in place.

In 2000, there were 5.6 million servers installed in the United States, with 4.9 million low-end servers, 663,000 mid-range servers and 23,000 high-end servers. By 2005, the number of installed servers grew to 10.3 million with all the growth in the low-end, which had increased to 9.9 million units. The mid-range and high-end servers had declined to 387,000 and 22,200 units, respectively. The 2005 data center servers consumed 45 billion kilowatt-hours (kWh) of electricity, equal to 0.6% of all electricity consumed in this country, at a cost of \$2.7 billion.

On a worldwide basis, the total number of data center servers grew from 14.1 million to 27.3 million between 2000 and 2005. Just as in the United States, the growth was all in the low-end servers – from 12.2 million to 26 million – while mid-range and high-end servers both declined over the five-year period. Total power consumption was 123 billion kWh, equal to the electricity output of 14 power plants, at a cost of \$7.3 billion.

In 2006 U.S. data centers consumed 61 billion kWh, or about 1.5% of total electricity consumed here

The EPA study found that in 2006 U.S. data centers consumed 61 billion kWh, or about 1.5% of total electricity consumed here. The total cost of that electricity was \$4.5 billion, which is more than the electricity consumed by all color televisions in the country and equal to the electricity consumption of about 5.8 million average U.S. households. The important finding was that data centers’ power and cooling infrastructure accounts for about half of the electricity consumption. Much of the power is used to fuel giant chillers that pump cold air into data centers through air vents and under raised floors at temperatures ranging somewhere between the 40s to mid 50s degrees in order to guarantee that no single server’s temperature gets much above the optimum level of about 70 degrees. But as the EPA points out, the air conditioning doesn’t have to be as cold if the layout of the server rooms are better designed to improve air flow and eliminate various microclimates that can develop.

“There are probably two key metrics for the IT guy: no downtime – if the boss’ e-mail doesn’t work, he hears about it right away – and ‘no security breaches’ on my watch”

To correct this problem and reduce future data server electricity consumption, manager attitudes need to be altered. According to Eric Birch, Executive Vice President of Degree Controls Inc., which sells a system that increases electronics cooling efficiency put it, “There are probably two key metrics for the IT guy: no downtime – if the boss’ e-mail doesn’t work, he hears about it right away – and ‘no security breaches’ on my watch. They normally do not know, don’t care and aren’t measured by their electricity bill.” Once the person

Changing attitudes of IT professionals reminds us of the struggle waged within the petroleum industry in getting drilling departments to drill oil and gas wells in ways that are safe yet less damaging to producing reservoirs

in charge of data servers is also held responsible for the totality of the center's operating costs, significant changes in data center design and operation will likely occur that could significantly lower future power consumption.

Changing attitudes of IT professionals reminds us of the struggle waged within the petroleum industry in getting drilling departments to drill oil and gas wells in ways that are safe yet less damaging to producing reservoirs. Drilling departments are measured on metrics such as the cost to drill wells and their safety record, but not on the quality of the reservoir they turn over to the production department. As a result, production departments often must overcome the damage drilling did to the reservoir, which means they must spend more money correcting problems and possibly not being able to recover optimum volumes from the reservoir. If the drilling and production departments work together, often wells can be drilled more efficiently, cheaper and safer while also delivering a reservoir that will produce greater volumes and boost the ultimate hydrocarbon recovery factor at a lower total cost. At the end of the day, changing measurement goals and shifting responsibilities are often the critical way to create major operational changes with positive financial results. Making those changes is more challenging than it appears.

Native Americans and U.S. Petroleum Supply

The casino issue highlights the unbridled economic power Native American groups have secured through the long-standing federal laws

In Charlestown, Rhode Island, the two biggest political issues are: the ongoing town council personality soap opera and the possibility of the construction of an Indian-owned casino on local land the tribe controls. Both issues are linked by the political personalities who comprise the Charlestown town government. The casino issue highlights the unbridled economic power Native American groups have secured through the long-standing federal laws that provide the tribes with total freedom from state and local control over the activities conducted on their land. Developments some 3,000 miles from Charlestown regarding the possible expansion of the economic clout of Native Americans may reverberate here.

The question of whether the current federal protection for tribes' religious or burial sites can be expanded to include potential tribal sites

Arizona Clean Fuels, the company seeking to build the first new, grass-roots refinery in the United States in 30 years, is now facing a lawsuit from the Quechan Tribe seeking to delay the permit enabling the project to move forward. After previously failing to secure an injunction preventing the transfer of land from the U.S. Bureau of Reclamation to the Welton/Mohawk Irrigation and Drainage District that includes the parcel for the proposed Arizona Clean Fuels refinery in eastern Yuma County, the Tribe has filed a lawsuit. At issue is the question of whether the current federal protection for tribes' religious or burial sites can be expanded to include potential tribal sites.

The Tribe's lawsuit demands a lengthy and costly archaeological investigation be launched at the site to determine if their claims have

Arizona Clean Fuels claims that no tribal artifacts have been found near the site

merit. It was previously determined that this land was not religious land or a burial site for the Tribe, but not whether the land was a potential tribal site. Arizona Clean Fuels claims that no tribal artifacts have been found near the site and that virtually all the land to be acquired was “disturbed land,” i.e., all 1,400 acres had been previously farmed with cotton. Within the 39,000 acres that were transferred by the U.S. Bureau of Reclamation, 2,124 acres with 19 known eligible religious or burial sites were excluded and remain under federal government control under the current laws.

We’ll be watching the outcome of this lawsuit. If the Tribe prevails in this case, then it could redefine what is considered sacred tribal land and open the door for additional lawsuits from other U.S. tribes, including the Narragansett Tribe in Charlestown, Rhode Island.

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