PPHB
ENERGY INVESTMENT BANKING

MUSINGS FROM THE OIL PATCH

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

Here Come The Millennials – Good For Energy Demand?

Millennials, most of whom have reached adulthood since 2000, could surprise America and the world in the coming years with their economic might and spending power

A recent issue of the financial newspaper, *Barron's*, had as its cover story an article entitled "On the Rise" with the tag line, "A lost generation? No way! The Millennials are finally poised to start spending, which is good news for the economy and stocks." The logical question about this story is what does the article's conclusion suggest for future energy demand, and especially for gasoline? The article focused on how the Millennials, most of whom have reached adulthood since 2000, could surprise America and the world in the coming years with their economic might and spending power, impacting the outlook for industries such as housing and autos (both energy sensitive) along with retailing and financial services. Since this population segment is maturing as we debate the future of entitlements – both here in America and globally among Western economies – Millennials are less confident entitlements will provide them the income and services currently available, meaning they will need to begin saving sooner and save more than their parents, which is good news for the stock market but not necessarily for consumption.

This group represents the largest population segment the U.S. has ever seen

Just who are the Millennials? They are sometimes called Generation Y by demographers, and they represent young adults ranging in age from 18 to 37 years old. This group represents the largest population segment the U.S. has ever seen – 86 million strong, which is 7% larger than the baby-boom generation. Some estimates suggest the Millennials will keep growing to 88.5 million by 2020 due largely to increased immigration.

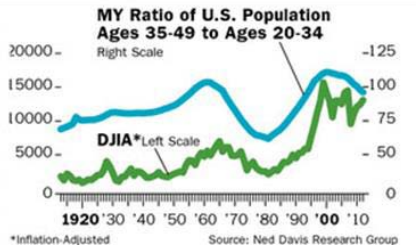
The baby-boomers came of age during the 1970s and 1980s, and their views were colored by inflation, recessions, the Vietnam war, gasoline lines and energy shortages followed by the greatest energy price drop in history during the mid-1980s. The baby-boomers drove

Exhibit 1. Will Millennials Bail Out U.S. Economy? Are Demographics Destiny?

The Millennials are the largest generation ever, and will be a boon for the market. History indicates that the stock market performs well whenever middle-agers, who save and invest, outnumber young adults.

Generation	Ages	Size* (mil)	Percent of U.S. Population
Greatest	68-	35.2	11%
Baby Boom	48-67	80.3	25
Generation X	38-47	40.9	13
Millennials	18-37	86.0	27
iGen	0-17	74.0	23

*U.S. Census projections for 2013 based on 2010 Census.
Sources: Peter Francese; U.S. Census



Source: ***Barron's***

Economists expect that as the Millennials hit their stride economically, they will revive the lackluster U.S. GDP annual growth rate to 3% or better

the economy in the 1990s. Growth during that period averaged 3.4% per year. The Millennials have grown up with multiple wars in the Middle East, mass shootings, terrorist attacks, TSA security screening, the financial crisis and the weakest economic recovery since the Great Depression, all of which is coinciding with the groups' entry into the job market. Economists expect that as the Millennials hit their stride economically, they will revive the lackluster U.S. GDP annual growth rate to 3% or better, up a full percentage point from the average of the past several years.

The Boston Consulting Group (BCG) suggests the Millennials, who they classify as adults between 18 and 34 years old, account for $1.3 trillion in annual consumer spending, or 21% of the national total. The BCG estimates that once the economy exits the current extended period of sluggish growth, which the consultants estimate will be helped by the growing importance of this population group, consumer spending will return to its long-term average growth rate of 3.5% to 4%, up from the current 2% annual rate.

Millennials have helped drive up the number of college students in the United States by 30% from 2000 to 2011

The Millennials are already showing their clout in the economy in several areas. First, due to the size of the population segment and facing dismal job prospects, the Millennials have helped drive up the number of college students in the United States by 30% from 2000 to 2011. That growth has partly been encouraged by the Obama administration's emphasis on the need for college degrees in order to compete successfully in the job market, coupled with the federal government's largess in providing cheap educational loans, which may create the next financial crisis for the country. There is $1 trillion in student loan debt outstanding, exceeding all the debt in the automobile market. This could be a limiting factor on Millennial spending as one wag suggests, "These people have a mortgage but no home." The author of the *Barron's* article pointed out that figures from the Federal Reserve Bank of Kansas City show the average student loan among Gen Y-ers is $25,000, and the median loan is only $14,000. Less than 1% of this population group has student loans larger than $100,000. Gen Y-ers, however, now buy only about a quarter of all new cars, down from 40% in the 1980s.

Nineteen percent of young men between the ages of 25 and 34 live with their parents

Millennials are also impacting the demand for apartments around the country, stimulating new multi-unit housing construction. Nineteen percent of young men between the ages of 25 and 34 live with their parents, while 9.7% of similar aged young women live at home. As this age group's unemployment rate improves – it currently is 7.4%, but below the national average of 7.6%, and down from 8.9% in January 2012 – they are finding jobs and moving out on their own. According to estimates from the ISI Group's Global Demographics Research, this age segment has recovered almost 75% of the jobs it lost to the recession.

An economist with Ned Davis Research suggests that the MY ratio will bottom in 2015 and then rise through 2029, which supports their long-term bullish case for stocks

There is an interesting population ratio that appears to have some bearing on the performance of the stock market, although we are not sure whether it is predictive or merely a coincidence. The MY ratio compares the size of the middle-aged population of 35-to-49-year-olds with that of the young-adult population, ages 20 to 34 years old. When the MY ratio is rising, meaning that the older segment outnumbers the younger one, the stock market typically does will. The MY ratio has been falling since 2000, which is a reason offered by some to explain the underperformance of the stock market during the first decade of this century. An economist with Ned Davis Research suggests that the MY ratio will bottom in 2015 and then rise through 2029, which supports their long-term bullish case for stocks. Since the stock market has soared to new heights in recent months, one has to wonder what that means for the predictive power of the MY ratio. Then again, maybe the lack of support from the MY ratio helps explain how much the stock market's performance has been dependent on the easy money policy of the U.S. Federal Reserve, along with similar monetary ease in Europe and Japan.

Another study showed that in the twenty years since 1988, the number of miles driven by Americans in their 20s fell by 8%

Besides consumer spending and housing, the Millennials are expected to impact the automobile industry – providing an impetus to growth but altering historical trends. Several demographic and social trends will impact the number of vehicles this population segment buys and what type of vehicles they purchase. In the late 1970s, 86% of American 18-year-olds of both sexes had a driving license. That was a peak in the American teenage love-affair with automobiles. Auto researchers at the University of Michigan found that in 2010 only 61% of 18-year-old Americans had driver licenses. Another study showed that in the twenty years since 1988, the number of miles driven by Americans in their 20s fell by 8%. Can these trends be reversed? Today, more than half the world's population lives in towns and cities, which have limited space for cars. Additionally, urban dwelling often reduces the need for a vehicle as distances traveled are short and there are multiple transportation options available. Millennials are often more interested in interacting with their friends through social media sites rather than in person. Finally, there is a study of Millennials that found they have a preference for having access to cars rather than owning them. This suggests that small cars will increase their share of the future new vehicle market, which puts pressure on

automakers to figure out how to make profits on small cars, something the industry has struggled with for decades.

There is little doubt but that the sheer size of the Millennials will impact global economic and social trends

There is little doubt but that the sheer size of the Millennials will impact global economic and social trends. Our question is whether the social trends associated with this segment of the population will mute the impact from its sheer size on expected economic trends. We believe that it will and therefore we see little about this group's coming of age that will significantly alter the underlying negative trends for American gasoline demand.

Activist Shareholder Exposes Shale Loss For Hess Energy

Since analysts began challenging several years ago the successes trumpeted by E&P companies actively engage in shale gas projects, and now liquids-rich prospects, there have always been two points of contention

Since analysts began several years ago challenging the successes trumpeted by E&P companies actively engage in shale gas projects, and now liquids-rich prospects, there have always been two points of contention. First was the actual performance of the reservoirs in which the issues raised have been recognized and reluctantly admitted to by producers. The second challenge related to the financial results claimed and whether all appropriate costs were included. The great American gas shale revolution reversed our nation's declining natural gas production. As gas production stopped falling and began growing, the burgeoning supply drove gas prices sharply lower, partly due to the coincidence with recession-impacted consumption reductions and warmer than normal winters.

That shift forced companies to scramble to establish acreage positions in these wet shale plays resulting in them paying high prices for land

The fallout for the industry from the extended period of weak natural gas prices has been a lack of gas shale profitability resulting in companies being forced to shift their focus to liquids-rich or crude oil related shale plays in order to generate cash flow. That shift forced companies to scramble to establish acreage positions in these wet shale plays resulting in them paying high prices for land. The surge in activity in these smaller wet plays created an explosion in drilling and well completion costs combined with an overwhelmed petroleum transportation system, all contributing to delays and higher than anticipated costs. The best example of these problems may be the analysis of Hess Energy's (HES-NYSE) adventure in the Eagle Ford shale of South Texas performed by Liam Denning of *The Wall Street Journal* and published in the paper's "Heard On The Street" column a couple of weeks ago.

Elliott Management has claimed the sale ended a venture that cost Hess shareholders $771 million

Hess reported a $265 million sale of acreage in the Eagle Ford shale basin in its first quarter earnings results. Management justified the sale on the grounds that it will help curb future spending. Hedge-fund and activist shareholder Elliott Management has claimed the sale ended a venture that cost Hess shareholders $771 million. While Hess doesn't report financial data that supports the Elliott estimate, Mr. Denning conducted research into the claim and came close to that estimate.

Mr. Denning calculates Hess spent $500 million to drill the 50 wells it sold earlier to Sanchez Energy

In 2010, Hess formed a partnership with ZaZa Energy (ZAZA-Nasdaq) to establish an Eagle Ford operation. By the time the partnership was dissolved in 2012, Hess reported it had spent just under $490 million on leases, bonuses and dissolution costs. To that total must be added the cost of drilling wells. According to comments on a 2012 midyear earnings release conference call with investors and analysts, Hess management stated that Eagle Ford wells were costing $8.3 million each, down from $10.3 million in the prior year. Using these well cost estimates for the two-year period of drilling, Mr. Denning calculates Hess spent $500 million to drill the 50 wells it sold earlier to Sanchez Energy (EN-NYSE).

On the other hand, if Hess earned twice as much from its production as estimated, then it still lost 60 cents of every dollar spent

On that 2012 earnings call, Hess said its capital expenditures targeting the Eagle Ford would approximate $380 million. Subtracting the estimated well costs of $230 million spent in 2012 leaves about $149 million of additional Eagle Ford spending. All totaled, Mr. Denning estimates that Hess invested $1.14 billion in its Eagle Ford properties. Using data from ZaZa through midyear 2012, and then applying the implied profit margins thereafter and Hess's U.S. general and administrative costs as an approximation of overhead, Mr. Denning estimates that Hess received about $100 million of cash flow from production. To that number he added the money paid by Sanchez for the wells and reaches a total return of approximately $365 million. That leaves Hess with a loss on its Eagle Ford effort of $780 million, or essentially the same figure Elliott suggested. Mr. Denning, being a good analyst, points out that his work relies on many estimates, but his conclusion suggests a loss of $2 for every $3 dollars spent. On the other hand, if Hess earned twice as much from its production as estimated, then it still lost 60 cents of every dollar spent.

The emergence of activist shareholders targeting E&P companies for mismanaging their businesses is the normal counterbalance of capital markets

This analysis highlights the challenge many E&P companies have had with shale plays over the past few years. Oftentimes E&P managements have cited financial analyses that don't comply with the data they are reporting to the securities regulators and/or they base their profitability claims on cost-structures that ignore "sunk" costs such as investment in acreage, geological and geophysical expenditures and overhead. The emergence of activist shareholders targeting E&P companies for mismanaging their businesses is the normal counterbalance of capital markets. Besides asset sales, bankruptcies and mergers and acquisitions are other ways in which the assets of over-leveraged and loss-generating E&P companies are recycled by the industry. We are in the midst of a significant restructuring of the domestic E&P industry driven by low natural gas prices and overinvestment by managements, but which may be slowing temporarily due to the doubling of natural gas prices this spring. For those managements of troubled E&P companies, we would remind them of what one of our stock market-savvy bosses used to remind us: "Wishing and hoping isn't a strategy."

Is It A World Of Plenty Or Old Mother Hubbard's Cupboard?

"Fossil and Nuclear Fuels – the Supply Outlook" study suggests the world's energy supply outlook is not as rosy as the IEA, Wall Street research and even the U.S.'s EIA suggest

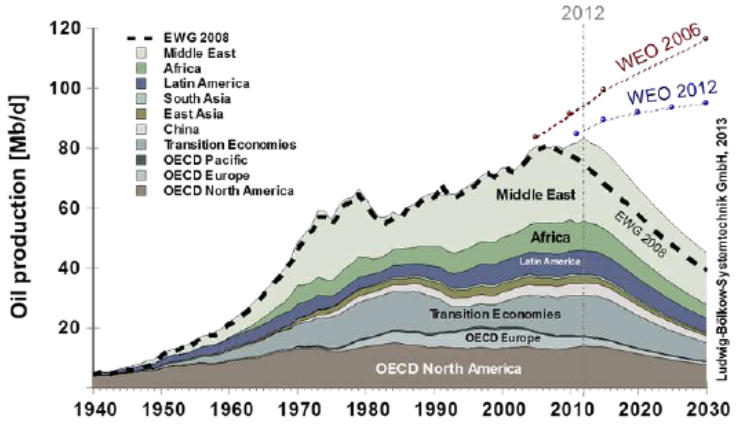
A new study about the global outlook for energy has been released by the Energy Watch Group (EWG), an international network of scientists and parliamentarians. The existence of this report was brought to our attention by an article in the Association for the Study of Peak Oil newsletter. Given the source, one should not be surprised that the "Fossil and Nuclear Fuels – the Supply Outlook" study suggests the world's energy supply outlook is not as rosy as the International Energy Agency (IEA), Wall Street research and even the U.S.'s Energy Information Administration (EIA) suggest. The EWG has a supporting organization and the researchers conduct their work independent of government and company interests and often without compensation. The focus of these researchers is on topics such as the shortage of fossil and nuclear energy resources, the development of scenarios for renewable energy and the evaluation of long-term secure energy supply at affordable prices.

The EWG has concluded that based on empirical data, world oil production has been on a plateau since 2005. They point out that even the IEA has acknowledged that conventional oil supply is peaking. The EWG concludes that the current and future activity of the oil industry will be focused on holding the oil production plateau for as long as possible. This assessment is considerably different from the optimists' view of "Saudi America" or total energy independence for the United States.

You are looking at oil output being essentially flat, which belies the view that global oil consumption will be growing by 40%-50%, a view Royal Dutch Shell suggests

In looking at the chart of historical and future global oil production from the EWG report, we note that its latest assessment is greater than its 2008 projection, but nowhere near the estimates for future production in either the IEA's 2006 or 2012 outlooks. What should be noted about the IEA's latest projection is how much lower it is compared to its earlier forecast. Some might say the IEA has become more realistic in its projections compared to its earlier rosy view. The important point about the chart (Exhibit 2, next page) is the sharply different outlook for future global oil output. If you split the difference between the two latest forecasts, you are looking at oil output being essentially flat, which belies the view that global oil consumption will be growing by 40%-50%, a view Royal Dutch Shell (RDS-A-NYSE) suggests in its recent energy scenario report.

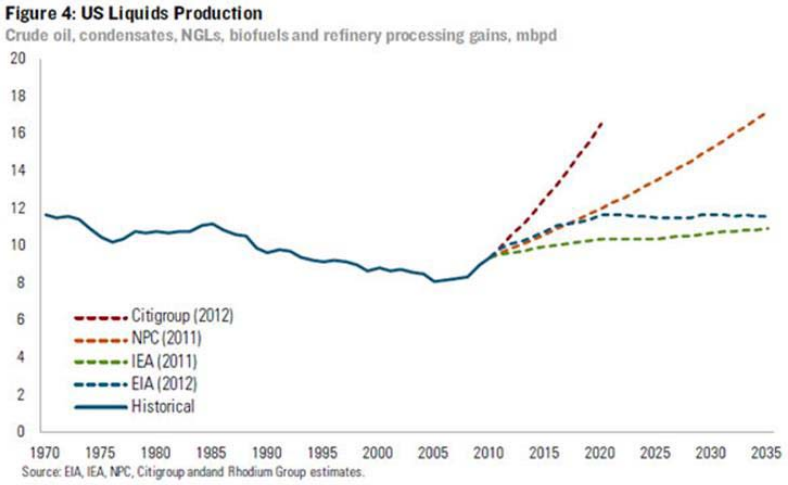
Exhibit 2. Oil Supply Declines Before IEA Projects



Source: Energy Watch Group

An interesting chart is in Exhibit 3 showing projections made by a handful of forecasters for future U.S. liquids (crude oil, NGLs, biofuels and refinery processing gains) output. What is interesting is comparing the more optimistic forecasts of Citigroup and the National Petroleum Council with those of the IEA and EIA.

Exhibit 3. Oil Output Up Some Or A Lot

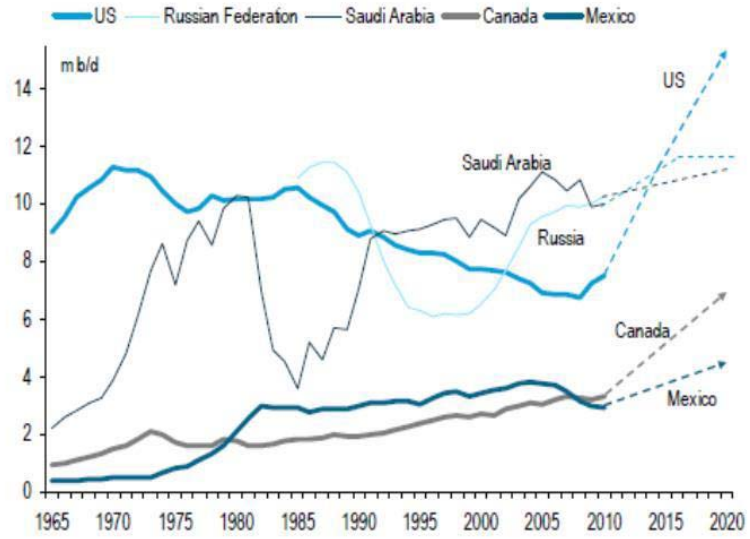


Source: Deutsche Bank

Citigroup concluded that by 2020 North America would become the new Middle East

Showing just how optimistic Citigroup is about the oil production capability of the U.S. compared to other major oil producing countries, the group's 2012 forecast shows a vertical increase in production. When the forecasters combine that projection with optimistic output forecasts for Canada and Mexico, Citigroup concluded that by 2020 North America would become the new Middle East.

Exhibit 4. Optimistic Outlook For North America Output



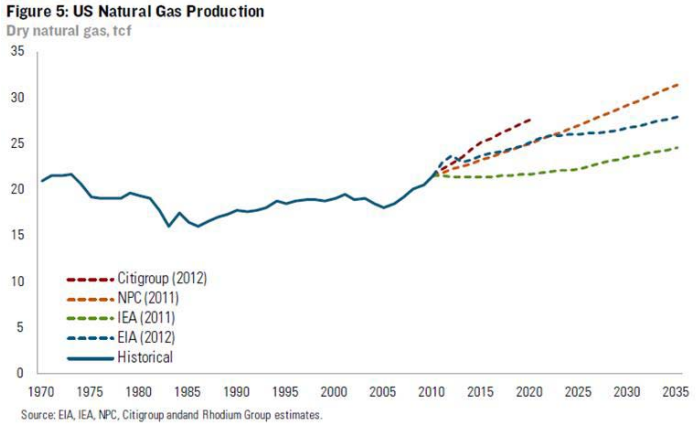
Source: Citigroup

It is projecting that between 2011 and 2020, some nine years, U.S. oil production will grow from 8,851,000 to 13, 514,000 barrels per day, slightly more than a 50% increase

Taking off on several of these optimistic forecasts, Wall Street investment research firms have fully embraced the concept of the United States and/or North America becoming home to the largest oil output growth in the future. That view helps Wall Street energy equity analysts sell investment recommendations for the stocks of domestic oil and gas producers and oilfield service companies who will help make these output forecasts come true. In examining the forecast of one of the Wall Street investment banks, it is projecting that between 2011 and 2020, some nine years, U.S. oil production will grow from 8,851,000 to 13,514,000 barrels per day, slightly more than a 50% increase. This forecast comes with the combined output of Alaska and the Gulf of Mexico remaining essentially flat – Alaska down and the Gulf of Mexico up – during the period. Essentially all the production growth will come from new Lower 48 tight oil and shale oil plays.

Turning to natural gas, the forecasters are equally as optimistic as they are for crude oil. Again, the EWG differs. In Exhibit 5 (next page), we show a set of natural gas production forecasts for the U.S. with all but the estimate by the IEA showing meaningfully higher outputs. The IEA forecast is lower through 2025, but then begins to climb above current production levels.

Exhibit 5. All Forecasts Call For More Natural Gas

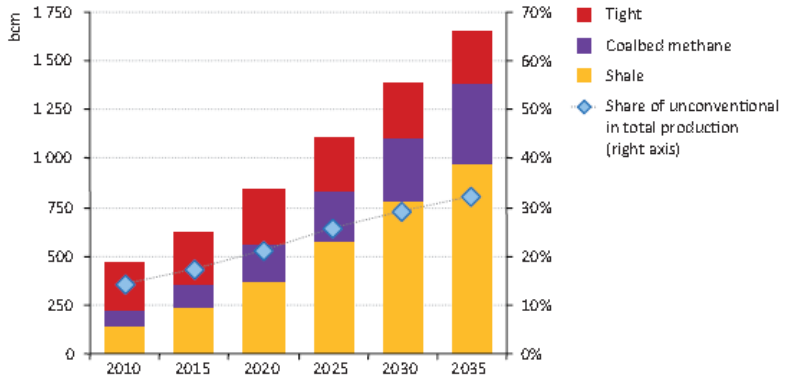


Source: Deutsche Bank

The IEA sees unconventional output, which contributed 14% of total gas supply in 2010 increasing its share to 21% by 2020 and to 32% in 2035

The IEA, in its *2012 Golden Rules* forecast for the global natural gas market, projected that gas consumption would grow at a 1.8% compound annual growth rate for 2010-2035. Their estimate is that global gas output will increase from 3,276 billion cubic meters (bcm) in 2010 to 5,112 bcm by 2035. Importantly, the IEA sees this production growth being supported by a global exploitation of shale gas resources. According to its forecast, the IEA sees unconventional output, which contributed 14% of total gas supply in 2010 increasing its share to 21% by 2020 and to 32% in 2035.

Exhibit 6. Gas Shale Is Very Important Supply



Source: IEA

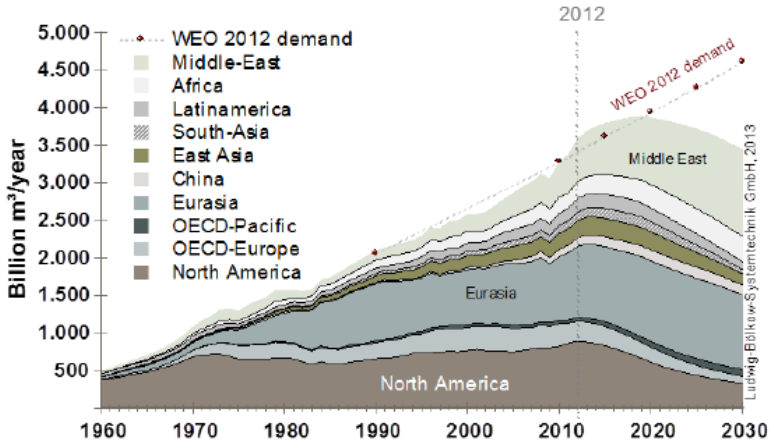
In contrast, the EWG sees global natural gas output peaking about 2020 and then beginning a slow decline

The IEA never specifies in the report where all this unconventional gas will come from, although they have sections in the report discussing gas markets in the U.S., Canada, Mexico, Europe, China and Australia. In contrast, the EWG sees global natural gas output peaking about 2020 and then beginning a slow decline. While the IEA appears bullish about gas output possibilities from North America (the U.S., Canada and Mexico), the EWG sees that output reaching a near-term peak before declining. The EWG also sees the OECD-Europe declining while Australia and China are projected

If these regions increase their natural gas output as suggested, it implies a robust expansion of the LNG business

to experience modest output growth. The two regions of the world the EWG foresee growing are Eurasia and the Middle East. If these regions increase their natural gas output as suggested, it implies a robust expansion of the liquefied natural gas (LNG) business and international pipeline volume growth. In any case, compared to the projection from the IEA's 2012 demand forecast, there will be a serious shortage of gas supply.

Exhibit 7. Gas Supply Grows In The Future

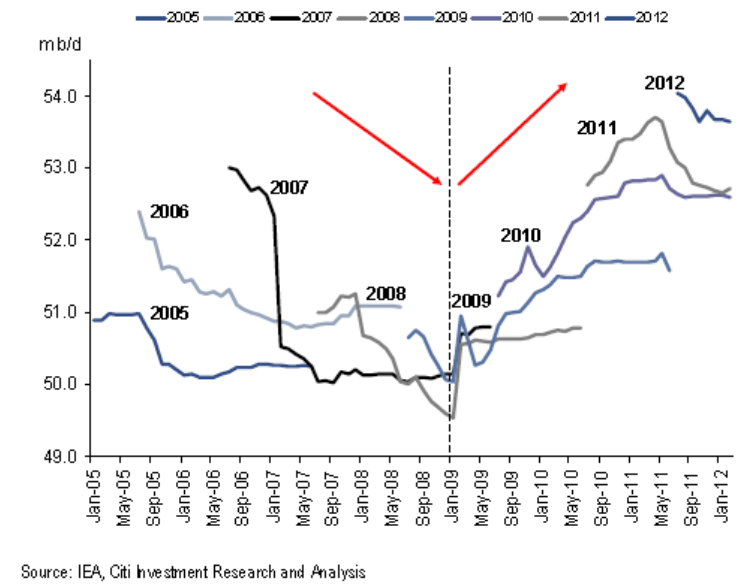


Source: Energy Watch Group

We believe the actual production profile will see more oil and gas than the pessimists forecast but less than the optimists

Is there a solid answer to our question headlining this article? Unfortunately, as with all forecasts, their accuracy depends on the validity of the assumptions underlying the projections. We believe there are many energy market forecasts that are based on extrapolations of recent production trends that may lack substance in geology and petrophysics. Many of these projections merely assume the industry will develop the technology to solve the technical challenges of increasing production, especially as it relates to the escalating costs of trying to extract hydrocarbons from increasingly poor quality rocks. We also tend to see that the optimists may be overly optimistic about the speed and significance of technological progress while the pessimists are probably equally as wrong. Therefore, we believe the actual production profile will see more oil and gas than the pessimists forecast but less than the optimists. The critical variable will be consumption, which many of these forecasts fail to adequately address.

Exhibit 8. Pessimistic View Of Output Turns Optimistic



Source: Citigroup

Forecasts are useful as a guide for the future, but they are not something to be cast in concrete as that will doom you to failure

Instead, we see optimistic forecasters basing their supply projections on trends such as the change in the pattern of IEA supply forecasts for non-OPEC oil in the past few years (Exhibit 8). That might be a valid trend, but based on our historical tracking of IEA forecasts, we have little confidence in them. Therefore, we tend to take a middle of the road position and are prepared to shift our outlook based on new data points. We believe there are certain fundamental trends in the world that will drive energy markets. Those include: the world economy will be powered by hydrocarbons for many decades to come; less developed economies will consume more energy as they aggressively industrialize and raise the living standards of their citizens; meaningful contributions from alternate energy sources are decades away; the quality of the rock from which we are getting our hydrocarbons is deteriorating; and technology will alter both the supply and demand curves, but we don't know when or by how much. Forecasts are useful as a guide for the future, but they are not something to be cast in concrete as that will doom you to failure.

The Car Of The Future – Relax It Drives Itself

Recently numerous articles have focused on "autonomous vehicles" as the "car of the future." The most visible company involved in helping establish this new transportation frontier has been Google (GOOG-Nasdaq), which sees the venture as a mechanism to promote their data gathering expertise because to function, these autonomous vehicles must be able to "see" and "understand" the

Much is being made of the technological aspect of collecting and interpreting massive amounts of data in order for a car to drive itself

environment in which they are traveling. While much is being made of the technological aspect of collecting and interpreting massive amounts of data in order for a car to drive itself, there remain other challenges for the car to succeed. Some of the challenges relate to the vehicles themselves, but also, how they are driven. Big questions remain as to the impact these trends will have on vehicle energy consumption and the social mores surrounding driving.

it is a huge leap from releasing technology to having a fully autonomous vehicle on the road

During a Society for Automotive Engineers conference in February, Anthony Levandowski, Google's product manager for autonomous driving stated, "I can't tell you you'll be able to have a Google car in your garage next year." That probably disappointed some of the engineers in attendance, but Mr. Levandowski went on to say, "We expect to release the technology in the next five years. In what form it gets released is still to be determined." As some in attendance pointed out, it is a huge leap from releasing technology, in whatever form is finally determined, to having a fully autonomous vehicle on the road. So the claim that autonomous vehicles will make their appearance in dealer showrooms in three to five years is probably overly optimistic.

Exhibit 9. Google's Autonomous Car On The Road

Source: Google

NHTSA - "Part of that has to do with if we should be looking at the underlying electronics"

Many have seen videos and pictures of Google's autonomous car driving around, but these are test drives. In order to become a commercial venture, there are a number of hurdles, both technical and regulatory, to be overcome. Dan Smith, senior associate director for vehicle safety at the National Highway Transportation Safety Administration (NHTSA), said, "It gets to be a massive challenge to figure out how will the government come up with a performance standard that is objective and testable for so many different scenarios where failure could possible occur. Part of that has to do with if we should be looking at the underlying electronics." The problem is that the NHTSA moves slowly with respect to new safety measures partly because it approaches its mandate methodically and also because it may not be up-to-speed on

technology. That latter issue was raised in a report issued last year by the National Academy of Sciences that questioned whether the NHTSA was current on car electronics and it recommended that the agency needs to take the lead in setting car electronics standards.

The safety aspect is a major reason along with the energy savings that could come

There are many reasons why industry and government would like to see autonomous vehicles developed. The safety aspect is a major reason along with the energy savings that could come eventually from a fully autonomous vehicle fleet, but that is likely 40-50 years in the future. The idea these vehicles will be on the roads in three to five years is probably overly optimistic.

Buyers of new cars today are often presented technology options that would be part of a fully autonomous vehicle

Buyers of new cars today are often presented technology options that would be part of a fully autonomous vehicle, for example, Adaptive Cruise Control, Lane-Keeping System and Active Park Assist. Many people are familiar with the last system as it has been advertised extensively in the marketing pitches for certain new cars. All you do is pull up next to the parking space and activate the system, which then maneuvers the car into a parallel parking space, something every new driver, and many older drivers, dread. The parallel parking maneuver is done while the driver sits there with his hands off the steering wheel.

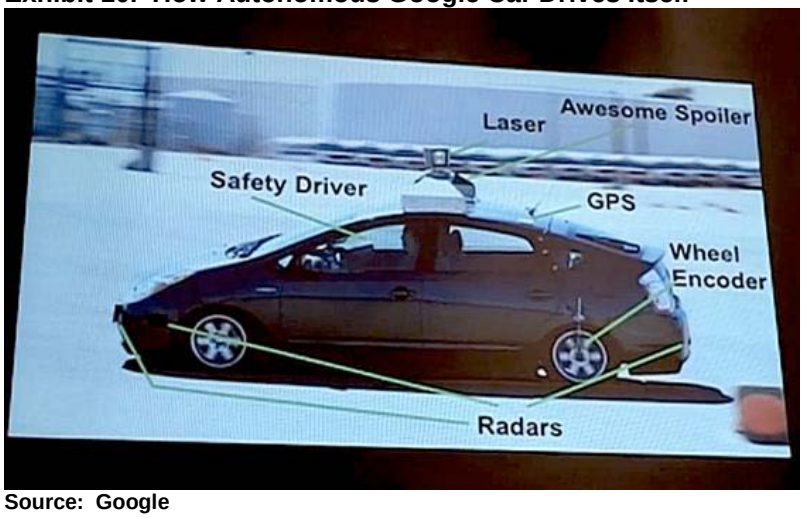
Expectations are that these systems will enable traffic to drive closer together reducing traffic congestion and the associated wasted fuel

There are cars equipped with the Adaptive Cruise Control and Lane-Keeping System, but they are being tested rather than marketed. The Adaptive Cruise Control system has sensors that track the speed of the vehicle in front and adjusts the vehicle's speed to maintain a constant distance from that vehicle. Lane-Keeping Systems track the center line marking and maintain the vehicle in the center of its traffic lane. Expectations are that these systems will enable traffic to drive closer together reducing traffic congestion and the associated wasted fuel. The presumption is that computers will stop a car faster than a human driver can react. These systems, however, have created problems that require adjustments. For example, cars with Adaptive Cruise Control have been known to speed up as they enter highway exit ramps since there is no traffic in front of them. Likewise, a car pulling in front will cause the sensor-assisted vehicle to brake and all following vehicles, when in real life a vehicle's driver would anticipate that the entering vehicle would maintain the same speed eliminating the need to brake.

For a Google car to function it must have an existing map of the environment through which it is passing in order to be able to search for the differences from current conditions

The Google car is equipped with a global positioning system and sensors. It also has a Velodyne 64-beam laser mounted on the roof for generating detailed three-dimensional maps of the surrounding environment. The car combines the laser measurements with high-resolution maps of the world producing different types of data models that allow it to drive itself while avoiding obstacles and respecting traffic laws. One of the requirements then for a Google car to function is that it must have an existing map of the environment through which it is passing in order to be able to search for the differences from current conditions.

Exhibit 10. How Autonomous Google Car Drives Itself



Source: Google

Recently, Google released images of the data and measurements its car must gather and interpret in order to make a left-hand turn. As the image demonstrates, there is a significant volume of data that must be gathered, analyzed and imputed into a decision tree in order for the vehicle to make the turn while dealing potentially with pedestrians, other vehicles ignoring traffic rules and other situations.

Exhibit 11. Massive Data Collection For Self-driving Car

Source: Google

A world completely populated with autonomous vehicles may be just as unrealistic as a world populated with individual space ships as suggested by the Jetsons

The goal of a world completely populated with autonomous vehicles may be just as unrealistic as a world populated with individual space ships as suggested by the Jetsons cartoon series of 1962-1987. Not only are there many regulatory standards that need to be developed, including how to safe-guard against electronic system failures and how a passenger/driver would be able to take-over the vehicle in that case, but there is also the question of accident liability determination that needs to be resolved. While computers don't

drive drunk or tired, how do we ensure that the passenger/driver is sufficiently alert and prepared to seize control of the vehicle in an emergency?

Would texting and cell phone use restrictions, a.k.a. distracted driving, be relaxed?

The energy industry and environmental movement see autonomous vehicles as a dramatic way for altering consumption and emissions. Vehicles that drive themselves and never have accidents can be built much lighter and designed to be more aerodynamic thereby reducing fuel consumption. We haven't even begun to deal with the social mores changes that autonomous vehicles would bring. Would texting and cell phone use restrictions, a.k.a. distracted driving, be relaxed? How about new rules for flirting while driving/traveling? Since the auto companies are determined to provide some of the systems to make driving more appealing and less stressful, we anticipate that over the next five years new vehicles will come equipped with these semi-autonomous driving features, but will allow the driver to choose whether he wants to use them or not, much like Active Park Assist and cruise control. Cars of the future will change and any change that makes them more efficient and safer will ultimately lead to a reduction in gasoline and diesel consumption, not necessarily good for the oil business. Only if these technological improvements encourage increased mileage per driver will it be good news for energy companies.

Canada's Oil Sands, Al Gore And The Ethics Of Oil

Mr. Gore declared that the country's oil sands boom and the Keystone pipeline debate "ultimately…hurts Canada."

A week ago, former U.S. vice president and now leading climate-change activist and private equity guru, Al Gore was interviewed by *The Globe and Mail,* Canada's national newspaper. In the interview, Mr. Gore declared that the country's oil sands boom and the Keystone pipeline debate "ultimately…hurts Canada." He referred to Canada's "resource curse" that in his opinion has led to "damage to some extremely beautiful landscapes, not to mention the core issue of adding to the reckless spewing of pollution into the Earth's atmosphere as if it's an open sewer." The "sewer" reference drew immediate reaction from industry and government officials, including Natural Resources Minister Joe Oliver who characterized Mr. Gore's statement as "wildly inaccurate and exaggerated."

He said he remained optimistic that environmental action would be taken, which he characterized as a moral battle

In a talk at Ryerson University, Mr. Gore expressed disappointment and frustration with the inability of the U.S. Congress to pass legislation dealing with global warming. He said he remained optimistic that environmental action would be taken, which he characterized as a moral battle. He said, "When these kinds of issues settle into a choice between right and wrong, then the moral clarity that eventually develops makes it possible to move quickly." He suggested that because total greenhouse gas emissions from oil sands are greater than for conventional oil, it becomes a more expensive option than a faster transition by the U.S. to renewable energy sources.

In commenting on his hope that the Obama administration would surprise on environmental policy, Mr. Gore said, "I still hold out hope that he will be as positively surprising in his policy initiatives this year as he was in his speeches." To the public, it seems they find Mr. Obama's speeches inspiring but his policies less so.

Exhibit 12. Canada A Leader In Cutting Emissions

	Total energy-related emissions of carbon dioxide			
	EMISSIONS (MILLIONS OF METRIC TONS)		NET INCREASE/	PROPORTIONATE
COUNTRY	2005	2011	DECREASE	INCREASE/DECREASE
China	5,463	8,715	3,252	59.5%
India	1,182	1,726	544	46.0%
Russia	1,587	1,788	201	12.6%
Japan	1,242	1,181	-61	-4.9%
Canada	624	553	-71	-11.4%
United Kingdom	583	497	-86	-14.8%
Germany	847	748	-99	-11.7%
Europe	4,675	4,305	-370	-7.9%
United States	6,000	5,491	-509	-8.5%

Source: ***The Wall Street Journal*****, PPHB**

Between 2005 and 2011, the latest year for data, Canada cut its carbon emissions by 11.4%, which exceeded the 8.5% reduction of the United States

In response to Mr. Gore's "open sewer" comment, Jack Mintz, holder of the Palmer Chair of the School of Public Policy at the University of Calgary, wrote an opinion piece published in the *National Post* pointing out that Canada was among the leading nations of the world in reducing carbon dioxide in recent years. The figures show that on a percentage basis, between 2005 and 2011, the latest year for data, Canada cut its carbon emissions by 11.4%, which exceeded the 8.5% reduction of the United States.

Forget science, this battle is being waged on moral grounds meaning the passion level is extremely high

It is clear that the battle over approval of the Keystone pipeline is merely a small piece in a broader battle over fossil fuels versus renewable fuels. Even within the fossil fuels sector, there is a struggle between heavy unconventional oils and less-polluting natural gas. Forget science, this battle is being waged on moral grounds meaning the passion level is extremely high; so high that certain policy and/or legal decisions may lead to civil disobedience, a phenomenon rarely seen in America. This struggle has a long ways to go, and we doubt it will have a favorable outcome for the fossil fuel industry.

Random Energy Thoughts

Norwegian Air Shuttle's Gamble And Risk

An article in *The Economist* on the status of a rapidly expanding low-cost Norwegian airline highlighted the gamble its management is making in aggressively expanding and the role/risk that oil prices could play in that strategy. Norwegian Air Shuttle (NAS.OL) began business handling commuter routes for Braathens, a regional airline part-owned by the governments of Sweden, Denmark and Norway.

In 2001, Braathens was absorbed by SAS AB (SAS.ST) and all its commuter routes were taken in-house. As a result, NAS was re-launched as a low-cost airline mainly serving Scandinavia. Its primary competitors are Ryanair (RYAAY-Nasdaq) and easyJet (EZJ.L0), the champions of cheap aviation in Europe.

If Ryanair's bet proves correct, its cost to operate its fleet of new planes will be lower than NAS's, assuming all other costs are essentially equal

Last year, NAS purchased 222 Boeing (BA-NYSE) and Airbus planes for roughly $10 billion. Earlier it had purchased a fleet of Boeing 787 planes. But now is the interesting challenge. Last month, Ryanair announced it would buy 175 Boeing 737s at a cost of about $8 billion. While NAS is buying the re-engineered "MAX" version of the 737, to be launched in 2017, Ryanair is choosing the less fuel-efficient version. Clearly there is a divergence in views about the future price of crude oil, and in turn, jet fuel. If Ryanair's bet proves correct, its cost to operate its fleet of new planes will be lower than NAS's, assuming all other costs are essentially equal. Moreover, other airlines would be able to operate their older planes at lower costs than these new planes further pressuring air fares.

To us the most interesting aspect of the article was the bet being placed on future oil prices

While the magazine's article was focused on the strategy of NAS and how it was competing against SAS by better utilizing its high-cost Scandinavian labor, to us the most interesting aspect was the bet being placed on future oil prices. Here is a corporate strategy decision with significant implications should it prove totally, or even partially wrong. Will Bjorn Kjos, the CEO of NAS, prove as successful as his Viking ancestors?

Offshore Service Industry Regulation Update

BSEE has expanded its regulatory oversight to service companies operating for the lease holder

Following BP plc.'s (BP-NYSE) Macondo oil spill in 2010, the federal government moved to revamp its regulation of the oil and gas industry, especially offshore drilling. The Interior Department reorganized the former Minerals Management Service (MMS) by breaking it into three parts, each with a more defined regulatory mission. One of the three resulting organizations – the Bureau of Safety and Environmental Enforcement (BSEE) – is charged with overseeing and improving the safety of offshore drilling and production operations. As part of its mandate, the agency has assumed a broader interpretation of its regulatory powers under the Outer Continental Shelf Lands Act (OCSLA). After decades of only administering regulatory oversight through enforcement actions against oil and gas operating companies, the actual offshore lease holder, BSEE has expanded its regulatory oversight to service companies operating for the lease holder.

We have written extensively about the debate over whether BSEE's interpretation is proper. Even if it is, the lack of proper rule-making actions that would enable offshore service companies to have input into drafting the rules for which they are subject to regulation should be undertaken. The point we have been making is that the regulation of service companies is well-beyond anything these

companies and their managements have ever been subject to. Therefore, the business environment within which service companies now must operate is radically different from anything they have encountered before and there will be un-intended consequences. For instance, service companies are being cited directly by BSEE for violations meaning they must deal with regulators, plus service companies now are required to assume joint and several insurance liabilities with their boss, the operator, and every other service company operating at the location. A potential consequence we suggested for publicly-traded service companies was their need to update their financial regulatory filings outlining this regulatory risk.

Service companies now are required to assume joint and several insurance liabilities with their boss, the operator, and every other service company operating at the location

We recently read the risk section of the 10-K filings of two publicly-traded offshore contractors - Nabors Industries (NBR-NYSE) and Ensco plc. (ESV-NYSE) - who recently received incidents of non-compliance (INCs) from BSEE inspectors for violating offshore regulations. What we found was that both companies have updated their risk language to reflect the new regulatory environment, although the scope of the changes was dramatically different between the two companies. Ensco had an extensive discussion of the evolution of BSEE and the expansion of its regulatory power. Nabors essentially judged that their prior language dealing with potential government regulatory oversight was sufficient, but the company did add language covering the "joint and several" liability change. Just out of curiosity we looked at the 10-K risk disclosure of Oil States International (OIS-NYSE), which sells offshore equipment along with providing some offshore services. They too have rewritten their governmental risk language to discuss the expansion of BSEE's regulatory scope. To us it looks like the corporate lawyers and advisors have made sure offshore service companies are not exposed from a failure to update their risk language for the new offshore regulatory environment.

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The Simple Truth – BP's Macondo Blowout

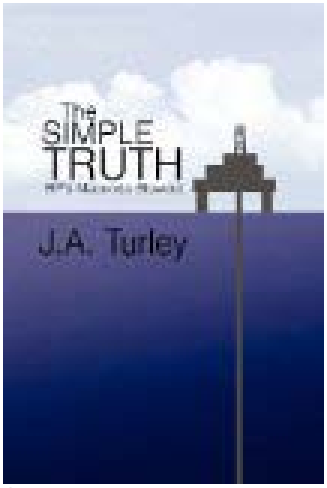
We were recently pointed to The Simple Truth by J.A. Turley as an outstanding nonfiction novel about BP's Macondo well disaster. J.A. (John) Turley has degrees in petroleum engineering and ocean engineering from the Colorado School of Mines and the University of Miami. He started his industry career with a three-year petroleum-engineering professorship at Marietta College before entering the private sector. He spent 20 years involved in offshore drilling- and project-management with a major U.S. energy company starting in the Gulf of Mexico and then the North Sea leading him to be named manager of worldwide drilling. During this time he received additional schooling at the Harvard Business School. After a number of years as the company's senior technical officer, he elected to retire early to concentrate on writing.

J.A. (John) Turley has degrees in petroleum engineering and ocean engineering from the Colorado School of Mines and the University of Miami

She uses her assignment on Transocean's *Marianas* and then its *Deepwater Horizon* rigs that drilled the initial and the fatal Macondo well to trail the BP company man (a petroleum engineer) asking questions and being educated about each and every step undertaken in drilling this well and deepwater wells in general

Mr. Turley's use of the novel form for telling the Macondo story gave him the license to simplify a complex story, while creating three individuals that represented the roles and responsibilities of BP and Transocean. One of the individuals is a young female geologist with BP who has plans to take time off to earn a petroleum engineering degree. She uses her assignment on Transocean's *Marianas* and then its *Deepwater Horizon* rigs that drilled the initial and the fatal Macondo well to trail the BP company man (a petroleum engineer) asking questions and being educated about each and every step undertaken in drilling this well and deepwater wells in general. Her responsibility is to monitor the mud flows and the cuttings to determine when the well reaches the target formation. At the same time, her education and job responsibility puts her in the position of comprehending the impending disaster and trying to stop it before the disaster unfolds.

Exhibit 13. Macondo Story



Source: Amazon

After telling the Macondo story, Mr. Turley goes through detailed analysis of the mistakes and alternative actions that might have been taken to avoid the well blowout and rig destruction

The book is loaded with understandable explanations of all the industry's technical terminology and their application, along with numerous illustrations and schematics of the hardware and the well's design. After telling the Macondo story, Mr. Turley goes through detailed analysis of the mistakes and alternative actions that might have been taken to avoid the well blowout and rig destruction. The author's education, job experience and access to the numerous studies of the accident enable him to clearly set forth the simple truth of the Macondo disaster. Having studied the accident, read several of the studies and followed the media reports from the recent trial, we found this book a fascinating and educational read about the Macondo disaster and offshore drilling in general. (Click on the hyperlink above to go to Amazon to purchase the book.)

China, Oil And The Bay Of Bengal

Efforts to develop several new ports along the Bay of Bengal on the eastern lobe of the Indian Ocean could transform the economic geography of Asia

Several years ago we wrote about the Chinese seeking alternate oil shipping routes and how they were focused on investing in southern Asia. Two *Musings* issues ago, we highlighted the role of China in the South China Sea and how it needed to demonstrate naval power there given its increasing imports of petroleum and raw materials to support the growth of its economy. The latest issue of *The Economist* has an article on how efforts to develop several new ports along the Bay of Bengal on the eastern lobe of the Indian Ocean could transform the economic geography of Asia.

Exhibit 14. Changing Economic Geography Of Asia

Source: ***The Economist***

China will not be exposed to having to haul all its African and Middle Eastern oil through the Strait of Malacca and the South China Sea

The article focused on India's efforts to modernize the port of Sittwe (Akyab) in Myanmar, which sits at the mouth of the river Kaladan, providing access to India's landlocked and impoverished northeastern states. Likewise, Thailand has always thought about cutting a canal across the Isthmus of Kra to reduce the shipping time from the Andaman Sea to the Gulf of Thailand that now needs to go through the Strait of Malacca. China's answer to the Strait of Malacca bottleneck has been to build a new port-terminal at Kyaukphyu near Sittwe that is at the head of an oil pipeline across Myanmar to Kumming, the capital of Yunnan province. This means China will not be exposed to having to haul all its African and Middle Eastern oil through the Strait of Malacca and the South China Sea. As part of this strategy, China needs to beef up its navy to establish some presence in the Indian Ocean to guarantee the security of its oil shipments. This is another example of the long-term economic and security planning by the Chinese government.

Social Science Research And Energy

Mr. Cheney was a political star

The extremes social science research will go to investigate issues seems to know no limits. A recent study in *B.E. Journal of Economic Analysis & Policy* investigated the amount of influence Dick Cheney, the former vice president of the United States, had on 15 companies connected to him over the years. Mr. Cheney was a political star – a congressional intern, youngest-ever White House chief of staff, six-term member of the House of Representatives, secretary of defense, director of the Council on Foreign Relations and CEO of Halliburton Companies (HAL-NYSE) before being elected George W. Bush's vice president. He was a friend to big business and the consummate Washington insider.

The conclusion of the study was that Mr. Cheney's financial influence was non-existent

The study was an attempt to examine Mr. Cheney's influence on companies connected to him, not only Halliburton. The researchers were interested in companies on whose boards he sat and firms whose boards included former Halliburton colleagues. The thesis to be tested was that if the firms were truly dependent on Mr. Cheney's patronage and clout, then their stock prices should have risen along with his influence. The conclusion of the study was that Mr. Cheney's financial influence was non-existent. The question is whether Mr. Cheney wasn't as influential as everyone thought or that the stock market didn't see it. Either way, one has to wonder about the quality of research in academia these days.

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