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SPECIAL EDITION - ENERGY

This SPECIAL EDITION of the Blue Paper departs from our regular purpose of discussing changes and current characteristics of the gas station business and markets in Arizona, and instead discusses energy. While this may seem more strategic than the circumstances and dealings of the gas station real estate and business markets, with some consideration it becomes apparent that a broader scope on energy is clearly a relevant factor in our longer term business and investment decisions.

Benchmarks

Before we explore too deeply, let's identify some points of reference … hopefully it will help put things in perspective. (Data is from 2006 and does not reflect changes of the current global recession which officially began 12-07.)

World oil production was approximately 84 million barrels (bbls) per day.
The U.S. produced about 8.3 million bbls/day. (The world's 3rd largest producer!)
Saudi Arabia, OPECs largest single producer, produced 10.7 million blls/day, and the second largest producer, Russia, produced 9.7 million blls/day
The U.S. consumed about 23 million bbls/day. (Hence, we must have imported about 14.7 million bbls/day, or 64% of our consumption.)
The U.S. strategic petroleum reserve (SPR) has a maximum capacity of 727 million bbls.
Saudi Arabia dominates proven reserves with 262 billion barrels in the ground (About 67 years production at the current rate).
The U.S. has the 12th largest volume of proven reserves with about 22 billion bbls.
Of the eleven countries with the largest proven reserves, eight of them are OPEC members. (Not sure how many of them we think like us!)

Peak Oil

Peak Oil theory was originated by American geologist M. King Hubbert. In 1956 Hubbert proposed (theorized) that global oil production was in the process of peaking, would soon level off, then start to decline. He predicted that U.S. oil production would peak between 1965 and 1970. When production peaked in 1970, it was interpreted as proof that Hubbert's model was correct and that US oil production had entered a period of inexorable and irreversible decline. Unanswered was the question of whether or not U.S. production had declined simply because it had become cheaper to purchase imported oil. The theory does not rest on any assumptions about future demand. Regardless of whether demand skyrockets or plummets, the rate of production is destined to decline at some point. It is not a matter of if, but when.

Predictions and theories are two different things. The proposal that petroleum resources are finite and that as withdrawn will ultimately run out cannot be well refuted. The prediction, however, as to when that will happen is dependent on several variables not having to do with the total amount of resources.

At the time, Hubbert predicted that the maximum possible U.S. oil production by 2011 would be one billion barrels. But actual production in 2011 was two billion

> barrels. Hubbert predicted that annual world oil production would peak in the year 2000 at 12.5 billion barrels. It didn't. World oil production in 2011 was 26.5 billion barrels and continues to increase. Hubbert was grossly wrong about natural gas production. In 1956 he predicted that by 2010 U.S. annual gas production would be 4 TCF. But in 2010, U.S. wells produced more than 26 TCF of gas.

Some years ago discussion started to surface. Scholars, geologists & strategic planners at major oil companies, government leaders and the like started to circle the wagons about the topic, each of course with their own particular take driven by their individual interests. In fact, of course, they're right! For example, take an oil well called the McClintock No.1 drilled south of Titusville, PA., in 1859. Although it didn't start producing until 1861, it's still producing Pennsylvania-grade crude oil 151 years later - just not very much. 151 years from now, Saudi Arabia's Ghawar field will still be producing oil from its thousands of wells, just not 4 million barrels per day like we see now … maybe 40,000 barrels per day. Are we running out of oil? No… at least not in our lifetimes.

The flaw in extending the Peak Oil theory into a prediction is that the prediction assumes the amount of a resource is a static number determined solely by geological factors, which is clearly not the case. But the size of an exploitable resource also depends upon price and technology. How much oil can be exploited has nothing to do with the finite amount of oil that exists in Earth. The amount of oil that is exploitable in the future may change one's predictions when Peak Oil hits, but it does nothing to disprove the Theory of Peak Oil. The US oil industry began in 1859 when Colonel Edwin Drake hired blacksmith Billy Smith to drill a 69-foot-deep well. Subsequent technological advances have opened up resources beyond the limits of our ancestors' imaginations. We can drill offshore in water up to eight-thousand feet deep. We have enhanced recovery techniques, horizontal drilling, and four-dimensional seismic imaging. Oklahoma oilman Harold Hamm is turning North Dakota into Saudi Arabia by utilizing hydraulic fracturing technology. U.S. oil production has reversed its forty-year long decline. By the year 2020, it is anticipated by some that the U.S. will be the world's top oil producer. For at least a hundred years, people have repeatedly warned that the world is running out of oil. In 1920, the U.S. Geological Survey estimated that the world contained only 60 billion barrels of recoverable oil. But to date we have produced more than 1000 billion barrels and currently have more than 1500 billion barrels in reserve. Conventional oil resources are currently estimated to be in the neighborhood of ten trillion barrels. In addition to conventional oil, the U.S. has huge amounts of unconventional oil resources (e.g. shale oil) that remain untouched. The western U.S. alone has 2000 billion barrels of oil in the form of oil shale. And we'll be lucky to net 200 billion of that. At a current consumption rate* of 7 billion barrels a year, that's a 286-year supply.

Peak oil, however, does have current relevance in the economic sense. The easy (cheap) oil has been produced, except in those instances where proven reserves have been withheld from production for non-economic reasons, e.g., political. The outlook, then, for oil is pricing escalation. This is not news; we've all experienced the price spikes that have occurred over the last 8-10 years. These, however, were supply-demand imbalances caused by a variety of events and circumstances, and since classified as temporary in nature, are spoken of as price volatility. Longer term trends play out over decades. In that longer term arena, however, the pricing trend is clearly up … from $.25/gal. in the 60's to perhaps $3.00/gal. today (smoothed for volatility). The price driver, however, is not supply-demand per se, but rather the cost of technology for production, and more fundamental than that, the declining value of the dollar – a political and economic problem rather than a geological one.

* Current consumption is not expected to remain static. Worldwide oil demand is up nearly 15% just since 2002. When you break that down, it amounts to 60,000 barrels every minute ... or more than 1,000 barrels of oil every single

second! Most of this new growth came from countries like China and India ... and other emerging markets in South America and Africa. And demand is accelerating.

Aside from our wallets, the subject of oil, and energy (alternative or otherwise), has become a hot button for obtaining votes, and the politician who can spin the subject to his advantage is points ahead in the polls of the day. Thus, oil and energy are now geopolitical tools for domestic and foreign policy, economic negotiations, trade talks and treaties, etc. From a strategic viewpoint, then, it's difficult to discuss oil without considering political causes and impacts.

What seems clear at this time, however, is that to remain competitive the local gas station may soon have to offer some of the various forms of alternative energy … how much and how soon? Don't know! We have in fact some of this now. E85 blend is available in several stations in AZ, as is natural gas and propane. At what point does the station start stocking lithium dry cell batteries, hydrogen exchange converters, and other technology beyond the scope of this discussion? Don't know that either. For alternative energy to be a viable alternative to fossil fuel, it has to have an economic equivalency, i.e., be price competitive. From this purely economic standpoint, we believe it will take a price per gallon at the pump well in excess of $7.00-8.00/gal. "Green" politicians, however, with an agenda to save the earth regardless of cost could engineer "expensive" gasoline literally with the stroke of a pen!!

Our current problem with petro energy is not the supply or resources in the ground; it's that public policy has hamstrung producers through regulatory and economic disincentives from bringing these resources to market, intervening in free-market determined pricing of petro energy vs. alternative green energies. Given the economic climate in the U.S. and throughout the world in general, it's unlikely that governments will be able to continue to subsidize alternative energies to the detriment of petroleum-based energy.

One resource that is both a petroleum-based energy as well as an alternative energy is natural gas – more on this below.

Bakken Formation

Information released by the U.S. Department of the Interior, U.S. Geological Survey April 2008 (can't be considered "news"). North Dakota and Montana have an estimated 3.0 to 4.3 billion barrels of undiscovered, technically recoverable oil in an area known as the Bakken Formation. A U.S. Geological Survey assessment released April 10, shows a 25-fold increase in the amount of oil that can be recovered compared to the agency's 1995 estimate. The Bakken Formation estimate is larger than all other current USGS oil assessments of the lower 48 states and is the largest "continuous" oil accumulation ever assessed by the USGS. A "continuous" oil accumulation means that the oil resource is dispersed throughout a geologic formation rather than existing as discrete, localized occurrences. The next largest "continuous" oil accumulation in the U.S. is in the Austin Chalk of Texas and Louisiana, with an undiscovered estimate of 1.0 billions of barrels of technically recoverable oil.

"It is clear that the Bakken formation contains a significant amount of oil - the question is how much of that oil is recoverable using today's technology?" said Senator Byron Dorgan, of North Dakota. "To get an answer to this important question, I requested that the U.S. Geological Survey complete this study, which will provide an up-to-date estimate on the amount of technically recoverable oil resources in the Bakken Shale formation." The USGS estimate of 3.0 to 4.3 billion barrels of technically recoverable oil has a mean value of 3.65 billion barrels. Compare to Saudi Arabia proven reserves of 262 billion barrels; the U.S. ranks 20th globally in proven reserves at 21 billion barrels, estimated Jan. 2011. (Source: CIA) By this measurement, the Bakken field could increase U.S. reserves by 17%.

U. S. Geological Service update: The Bakken is the largest domestic oil discovery since Alaska 's Prudhoe Bay , and has the potential to eliminate all American dependence on foreign oil. The Energy Information Administration (EIA) estimates it at 503 billion barrels, even if just 10% of the oil is recoverable. At $107 a barrel, we're looking at a resource base worth more than $5.3 trillion. "When I first briefed legislators on this, you could practically see their jaws hit the floor. They had no idea" says Terry Johnson, the Montana Legislature's financial analyst. "This sizable find is now the highest-producing onshore oil field found in the past 56 years" reports The Pittsburgh Post Gazette. It's a formation known as the Williston Basin, but is more commonly referred to as the 'Bakken.' And it stretches from northern Montana, through North Dakota and into Canada. For years, U.S. oil exploration has been considered a dead end. Even the "Big Oil" companies gave up searching for major oil wells decades ago. However, a recent technological breakthrough has opened up the Bakken's massive reserves.... And we now have access of up to 500 billion barrels. And because this is light, sweet oil, those billions of barrels will cost Americans just $16 per barrel! That's enough crude to fully fuel the American economy for 41 years straight. We have more oil inside our borders, than all the other proven reserves on earth.

Here are the official estimates:

- 8-times as much oil as Saudi Arabia
- 18-times as much oil as Iraq
- 21-times as much oil as Kuwait
- 22-times as much oil as Iran
- 500-times as much oil as Yemen … and it's all right here in the Western United States.

The End of Petrodollars

January 10, 2008, oil finally (now initially) hit $100/barrel … the end of an era. Many speculated at the time that the rise in oil prices was due to geopolitics, rather than supply-demand. The smart people didn't consider that the exchange for U.S. dollars for barrels of black gold was anything but sustainable. In the old days, when oil prices rose, big exporters like the Saudis recycled most of their oil money into the U.S. bond market, giving rise to the term "petrodollars." And in fact, when the old days were the old days the U.S. dollar was pegged to gold, and even referred to as the gold standard. However, we set the stage for that to change in 1972 when President Nixon floated the dollar against gold. The dollar immediately and continually devalued against gold for several years, and continues to do so today. (Almost as a side note, the dollar also devalued against all other commodities that the U.S. imported or traded in. We can see the summation of this by reviewing our balance of trade deficit … it doesn't necessarily need to be a deficit, it just always has been!!) But Middle East oil producers now pump lots of money into local economies and oil price subsidies. These policies have led to much higher oil consumption in OPEC countries and will keep lots of oil from ever reaching the export market.

There are 2 variables described above that drastically affect the price of oil, besides currency translations. (1) the increase in domestic demand in the country of production, and (2), the decline in production as a function of peaking production. These 2 factors translate into the net oil not becoming an export for the producing country, or import anywhere else in the world. The top five net oil exporters from 2000-2005 were Saudi Arabia, Russia, Norway, Iran and the United Arab Emirates. Oil consumption in these five countries grew 3.7% per year over this period – does not consider the increase in consumption in China and India. Couple this with peak production declines of 5% per year, and the price escalation of oil arithmetically is 8.7% - if the rise were linear, which it isn't – and not factoring in increased consumption from China and India, or the weakness of the dollar. (The 5% decline rate is loosely based on the post-peak Texas decline rate of about 4% per year.)

A-h-h-h, for the good ol' days!!

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Why Do We Have the Department of Energy (DOE)?

Does anybody remember the reason given for the establishment of the DOE during the Carter Administration? (President Jimmy Carter, 1977-1981) It was very simple, and at the time everybody thought it very appropriate.

(Drum roll please.) The Department of Energy was instituted August 4, 1977 to (purpose!):

LESSEN OUR DEPENDENCY ON FOREIGN OIL!

In 2009, 32 years later …

* The budget for this necessary department is $24.2 billion per year,
* The department has 16,000 Federal employees, and
* About 100,000 contract employees.

* RESULTS … Let's look at the job they've done …

	U.S. Oil Production *	U.S. Oil Consumption *	Shortfall – Imports
1980	11,000,000 bbls/day	17,500,000 bbls/day	6,500,000 bbls/day
2007	8,400,000 bbls/day	21,000,000 bbls/day	12,600,000 bbls/day

Bottom line: we've spent several hundred billion dollars in support of an agency the reason for which none of us can remember. Well worth my taxes, how about you??

* Per the Energy Information Administration, official energy statistician of the U.S. Government.

Introducing Henry A. Waxman and Edward J. Markey (aka, "Cap-n-Trade", or "Cap-n-Tax")

Perhaps you're not familiar with these gentlemen … you soon will be! Permit me the introductions.

Congressman Henry A. Waxman is Chairman of the Energy and Commerce Committee, and Congressman Edward J. Markey is Chairman of the Energy and Environment Subcommittee and Select Committee on Global Warming. On March 31 of this year they released a draft of *The American Clean Energy and Security Act of 2009* (ACES), better known now as the Waxman-Markey bill. This bill was just last week passed by the House and is now in the Senate for debate and approval, or not.

Conservative opinion is that this is the largest (dollars), most invasive (broad in scope), tax increase in the history of the U.S. Quite a credential, no? Per the *Wall Street Journal, "*one of the most ambitious efforts to re-engineer American social and economic behavior in decades". With one of the stated objectives being "cutting carbon emissions by 83% by 2050", we should expect further social progress to replicate the stone age. Keith Rattie CEO of Questar (an oil and gas company) and an engineer, illustrated the basic math in a presentation at Utah Valley University on April 2 using Utah as an example.

> "Utah's carbon footprint today is about 66 million tons per year. Our population is 2.6 million. You divide those two numbers and the average Utahan today has a

> carbon footprint of about 25 tons per year. An 80% reduction in Utah's carbon footprint by 2050 implies 66 million tons today to about 13 million tons per year by 2050. If Utah's population continues to grow at 2% per year, by 2050, there will be about 6 million people living in our state. So 13 million tons divided by 6 million people equals 2.2 tons per person per year.
>
> "Question: When was the last time Utah's carbon footprint was as low as 2.2 tons per person? Answer: Not since Brigham Young and the Mormon pioneers first entered the Wasatch Valley and declared, 'This is the place.'"

So who's affected? Anyone, and everyone, who uses energy … any kind of energy. How are we all affected? Essentially the cost of energy will increase … a tax. (Tax: a price add-on for a good or service without additional benefit or value added, the recipient of which is a public entity.) It's anticipated if passed, this will be the final nail in the coffin of U.S. industries. Of course some could still compete and survive if they moved manufacturing facilities off-shore. What industries would be hit the hardest? Any high user of energy in their manufacturing process:

- steel (but there's already not much of that left),
- utilities, especially coal fired (but they're already regulated … get ready for brown outs while they struggle for price increases to cover their new tax load),
- automobile manufacturers (There's only 1 left to worry about – Ford. Fiat will close it's manufacturing in the U.S. and move it anywhere else, and GM is already a quasi-government entity – they'll undoubtedly be subsidized for this.),
- and, oh yes, oil refiners!!

Under the new bill, refineries are really screwed. Basically, they are on the hook for about 44% of U.S. carbon emissions. They would be among the biggest buyers of carbon emission allowances. With one stroke of the pen, the U.S. government just made the U.S. refining industry that much smaller. Lots of these older refineries will just have to close. U.S. imports for gasoline will rise. The refinery industry already sees the writing on the wall. This is one reason Valero, the biggest U.S. refinery, has been quick to get into the politically favored ethanol business. It's also expanding overseas.

Keystone XL Pipeline

The economics of the Keystone XL: (The following is excerpted from the book *The Endgame* by John Mauldin, and referenced frequently in his free newsletter, *Front Line Thoughts*. You can subscribe at www.frontlinethoughts.com/subscribe. Neither I, nor MJG, receive no compensation for this mention.) For this part of the discussion, let's start with the "given" that the U.S. has too much debt, and not enough economic growth (GDP). For a country (the public sector) to balance its budget while at the same time its private sector is deleveraging, it is necessary to reduce the trade deficit or even run a surplus. The U.S. has two main sources of its trade deficit: energy and China, in roughly equal proportions. If we reduce our energy dependence, we can get the trade deficit below 2% of GDP. (In 2011, the trade deficit was 3.7% of GDP. Taking it down to 2% would be a reduction of 46%.) The discussion about curbing U.S. consumer demand for cheaper imported goods from China is left for another time. On the other hand, the U.S. can do something about its energy dependence.

We are blessed with abundant energy, if we simply exploit it in a responsible manner. And doing so would directly create hundreds of thousands of jobs, many of them quite high-paying, and many more hundreds of thousands of jobs servicing those employed and their companies. Which brings us to the rather strange case of the Keystone XL Pipeline project.

This is to be a 1,700-mile pipeline designed to connect Canada's oil production in the province of Alberta with the U.S. Gulf Coast. The various government agencies of the current U.S. administration approved the project, after exhaustive environmental impact analyses. President Obama overruled his subordinates, postponing a decision until 2013, after the next election. Even though labor unions (normally thought of as Democratic and Obama allies) actively supported the project (as it means lots of jobs) various environmental lobbies were against it, and Obama apparently gave into them. The U.S. State Dept. estimates this project would create 5,000-6,000 jobs for a 2-year period. This project, it is believed, has been held hostage until after the November election. We started this section with a reference to trade deficits. And this is Canadian oil, not U.S. oil. So it does not help our trade deficit directly, although a large portion of U.S. dollars that go to Canada come back to the U.S. Canada is far and away our largest trading partner and major energy supplier, and certainly a friendlier and more stable supplier OPEC members. The problem is that the opposition is mainly of the "I don't like any carbon-based energy" variety. Whether it is coal or oil or natural gas, it is not as "clean" as solar or wind. The problem is that solar and wind simply cannot produce enough energy without huge government subsidies, at least with current technology (although that will change over time). In the meantime, if we want to balance our budget in the U.S. (and we must!), we are going to have to become energy independent as one part of the solution. In the short term (10-20 years), that means carbon-based energy. If we can produce our energy in the U.S. and we can, then why not create the jobs here rather than elsewhere, if jobs are our #1 political concern, as they seem to be, according to the polls? Further, in the short term, as Mexican production is falling rather fast, we are going to need that Canadian oil if prices are not going to rise.

Natural Gas

It's an election year, so politicians all over the country are telling us they have the solution to lowering oil and gasoline prices. But unless they can put the brakes on demand growth in China, India, and Brazil while simultaneously bringing peace to the Middle East, there's no way they can control oil prices! In the last 5 years, the number of cars on the road in China more than tripled. Nearly 10 million vehicles were added in 2010 alone. (For comparison, in the U.S. our record year for new car sales was 1985 with just over 11 million vehicles sold, and sales have been trending down steadily since 1999. In 2009 about 5.5 million new passenger cars were sold domestically.) In fact, China and India's demand is growing so fast that some experts say those two countries alone could consume all of the world's crude oil by 2030, if nothing changes. And that's precisely why America needs a new fuel plan ... one that can help us regain our energy independence for good. If we want economic prosperity and we want the pain at the pump to hurt less, some would say that we have to look at alternative fuels — cheap alternative fuels, especially for vehicles. Strike up the band for natural gas – compressed natural gas (CNG) and liquefied natural gas (LNG).

Last January, Waste Management (WM), the largest private hauler of waste and garbage in the U.S., announced it is converting its entire North American fleet to run on CNG. Global delivery giant United Parcel Service is adding CNG trucks to its fleet in the U.S. and Canada, and currently has 2,000 CNG trucks. Competitor FedEx operates CNG vehicles in Europe, Latin America, and Asia and the Pacific. And Ryder Systems, the biggest publicly traded U.S. truck leasing company, is also buying long-haul trucks that run on CNG.

When it comes to convenience store chains ready to offer CNG at the pump, Chesapeake Energy Corp. has named names for the first time. In an exclusive interview with *CSNews Online* in January, the natural gas manufacturer cited Love's Travel Stops & Country Stores and OnCue Express as the only two convenience store chains currently offering CNG. However, during an investor presentation this week, Chesapeake revealed that CNG fueling stations will soon be available at many more c-store/gas station chains. According to Chesapeake, 7-Eleven, Murphy USA, Gulf, **Valero**, Stripes, **QuikTrip**, Kum & Go, Wawa, Giant Eagle, Sheetz and Dandy Mini Mart will all soon offer CNG. In the supermarket

space, Chesapeake stated **Kroger (owner of Fry's)** and Meijer will also soon offer CNG fueling stations. Chesapeake added that c-store and supermarket chains are interested in offering CNG because it can save consumers 50 percent on their transportation fuel bills.

Previously, a lack of natural gas filling stations prevented long-haul truckers from investing in new fleets that run on CNG. On the 46,000 miles of interstate highway criss-crossing America, there are only 18 CNG fueling stations open to the public, and 14 of them are in California. a company called Clean Energy Fuels which builds CNG fueling stations for municipal fleets, plans to open 70 public CNG stations by the end of the year and another 80 in 2013.

Jan. 7, 2011: (Reported) CH4 Energy Corp. set the first Liquefied Natural gas (LNG) storage tank on its permanent foundation right after the new year. The move pushes the construction of a retail natural-gas fueling station in Utah one step closer to completion. CH4 Energy expects the station to be fully operational in five to six weeks. The station is rising at the Pilot Flying J travel plaza at the intersection of Interstates 80 and 15 in Salt Lake City. It is being developed with being partially funded by a Department of Energy/Recovery Act grant administered by the Utah Clean Cities Coalition. Once complete, the site will dispense CNG and LNG faster than any public natural gas fueling station in North America, according to CH4 Energy.

Mid-February 3M Company (think Scotch Tape) announced that it is pursuing a new venture to work on natural gas tanks for passenger cars! The company is partnering with a major natural gas firm to develop a new type of fuel tank that is lighter, cheaper, and has more capacity. 3M says this new project could make natural gas-powered passenger cars far cheaper and better performing — with much wider appeal. If a huge blue chip firm like 3M is now investing in the new fuel revolution that really says something! Meanwhile, as you read this, Japanese and U.S. governments are meeting to hammer out plans for the export of natural gas — which could include the introduction of new incentives for the use and export of natural gas! Once serious government money starts flowing into the natural gas sector, you'll see this boom take off.

So much for demand escalation, but what about production? Natural gas prices have plummeted. Natural gas storage is at a maximum. Producible gas reserves are up 35% in the United States. Demand for natural gas is down because of the economy. Then suddenly a new-found U.S. natural gas producible reserve is suggesting that the U.S. in fact could be self-sufficient or close to it as soon as 2030. Why are all of these things happening? A bit of it is due to the dynamic of the overall economy, but a lot has to do with the concept, and discovery of gas shale. The economically recoverable gas from the shale is now possible due to development and success of horizontal drilling technology — the development of *fracking technology*. Higher gas prices in the past gave us the confidence and allowed us to develop this technology. A huge factor is confidence. We know we can do it economically, so we are willing to spend the big dollars that are required to drill and frack one of these wells. Technology has now made it possible to produce gas from rocks that couldn't produce gas economically 10 years ago. In the past we were drilling more and more wells that produced less and less gas. All of a sudden, things have changed with these shale wells. We are drilling fewer wells, and each well is producing more and more gas - because of the frack technology and the wells being horizontal. Things have changed completely.

Royal Dutch Shell said that by 2012 it expects more than half of its output will be natural gas, not oil. ExxonMobil completed 8 projects last year – 7 of them for natural gas, not oil; 2 out of their 3 projects for this year are for natural gas. ConocoPhillips paid $5 billion for Origen, an Australian gas company. Meanwhile, Chevron hammers away at its mammoth Gorgon* liquefied natural gas project, of which Chevron owns 47%, off the west coast of Australia, at a total cost of more than $40 billion. This is a joint venture project with ExxonMobil, Royal Dutch Shell, Osaka Gas, Japan Gas and Chubu Electric. (Learn more at www.ChevronAustralia.com , or Google *Gorgon Project Australia*.)

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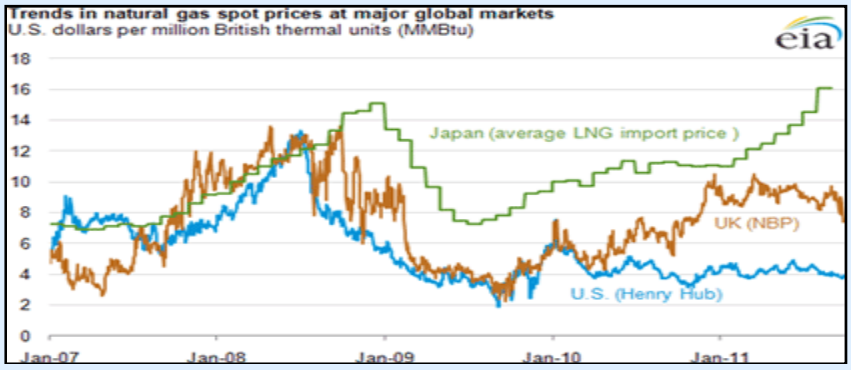
Why the move to natural gas? If you listen to the major news sources and Obama's announcements it would seem that electric vehicles are the coming thing. (Remember, Obama & Co. still owns 500 million shares of General Motors, with a major bet in electrifying that company's products.) Let's see what's at work here.

There are several things to consider. One is that new oil deposits are becoming harder to find. They are also costlier. The Kashagan oil field, which was supposed to be a great find in the Caspian Sea, is seven years behind schedule and billions of dollars over budget. Another factor at work is that 90% of the world's oil reserves are in the hands of national (country-owned) oil companies. They are off- limits for the likes of Exxon, Shell, and others. By contrast, natural gas deposits are more plentiful. They are also getting cheaper to develop. The cost to build an offshore LNG terminal is about half of what it was only two years ago. The big LNG plants can be just as expensive as anything in the oil world, but - unlike oil - these projects don't usually go forward unless there are long-term contracts in hand to support them. Some of these contracts go for 20- year terms. This makes the business more appealing to the majors who don't have to sweat the huge ups and downs they endure in the oil markets. With contracts in hand, the gas business is just one of putting together an Erector Set. As *The Economist* notes, "The gas business is really an infrastructure business: drill wells, build gas plants, install pipelines and accrue profits."

Mar. 11, 2011: 8.9 earthquake rocks Japan. It turned out to be one of the most shocking disasters in modern history - the massive earthquake, the gigantic tsunami, and multiple meltdown that struck the Fukushima Daiichi nuclear plant. the nuclear disaster - the largest since Chernobyl — had a dramatic impact on that country's energy policy. June of that year a poll of Japanese citizens conducted by *Asahi Shimbun* found that 74% of respondents wanted the government to ultimately decommission all 54 of the country's nuclear reactors. So last October, the Japanese government responded by proposing a dramatic long-term reduction in the nation's reliance on nuclear power. How then does the world's third-largest economy compensate for such a huge loss of energy? Of the choices available, and admittedly not many, the solution was natural gas. In the 11 months after the Fukushima Daiichi disaster:

- Japan's electric utilities have all switched to natural gas.
- The country has ramped up production at power plants fired by natural gas. But Japan's domestic production is able to meet only 4% of the country's demand!
- As a result, Japan, already the world's largest single importer of liquid natural gas (LNG), has had to ramp up its imports even further.

Predictably, Japan's increased demand for natural gas has driven up prices, as illustrated by the chart below from the U.S. Energy Information Administration (EIA).



Note that at the end of 2009 (prior to the Fukushima quake), Asia was the fastest growing global market for LNG, with Japan and South Korea accounting for 53% of the regasification capacity.

But there's more. The world's use of natural gas is growing faster than its use of oil. The IEA's guess is that oil consumption grows half-a-percent a year. Natural gas consumption, by contrast, should rise more than 50% in the next 20 years. Total, the big French oil company, is even more optimistic. It estimates that China will use much more natural gas than is commonly assumed. Only a lack of infrastructure keeps China's appetite for natural gas under wraps. But China is in the process of building that infrastructure today. It is only a matter of time before the natural gas markets feel China's impact. Finally, natural gas is cleaner burning. There is a lot of talk of carbon taxes of one kind or another, not only in the U.S., but abroad. Some believe it's only a matter of when, not if, governments punish dirtier fuels. Natural gas will benefit from public policy here. (When's the last time the energy business benefited from public policy, RE: Cap-n-Trade?)

However, don't expect the domestic price of natural gas to rise in a big way anytime soon. There is simply too much of it. Natural gas producers are all expanding production. Most are spending more to expand production than their cash flows support. This is happening even though most look like they don't make any money at $4 natural gas. (A recent survey put the industry average at $5.74.) The United States burned a record 182 million gallons of gasoline a day in 2007, according to the U.S. Energy Information Administration. Average gasoline prices climbed to more than $4 a gallon by spring 2008 and were above $5 a gallon in some locations by July. Nearly 60 percent of that demand was met with imported petroleum. If/when domestic gasoline prices get to $6-7/gal., natural gas becomes incredibly interesting.

Alternative Energy

Royal Dutch Shell's chief executive Peter Voser, predicted oil will remain the dominant energy source for decades - not to mention one that will become more difficult to obtain, and hence more expensive (*MarketWatch, Mar. 7, 2010).* Shell currently spends about one-fifth of its research and development budget on alternative energy, despite developments in technologies such as electric cars, wind power and other alternative energy sources, "we will need conventional oil" for the foreseeable future. "We cannot switch it off, …. I think what is dead is cheap oil," Voser said, adding: "There is sufficient oil around," but producers "will have to spend more to get it ... and I think you'll see that in the end price for consumers."

Marathon Oil Co. CEO Clarence Cazalot believes politicians who insist on a quick move from the use of fossil fuels to cleaner fuels are misguided. Efforts to hastily rid the nation of fossil fuels in favor of biofuels and renewable energy are "well-intended, but incomplete," because they don't consider a variety of energy sources. Renewable energy currently makes up about 10 percent of the world energy supply, he noted. By 2030, that share will rise to 12 percent. There's no "technological silver-bullet" that will change that.

Keystone Group LLC plans to open 1,000 CNG stations throughout the United States, according to a *Jacksonville Business Journal* report. The company will begin with a pilot project of opening 10 CNG stations in the near future and add more over the next four years. The pilot program will focus on fueling fleet vehicles. It is uncertain exactly how long it will take for all 1,000 CNG stations to open. Keystone has teamed with DeBartolo Development LLC to create the fueling stations. The companies are expected to join forces with local gas stations and convenience stores to increase accessibility to general consumers.

Kwik Trip Inc. (La Crosse, WI) has opened an Alternatives Fuels Station at its corporate headquarters in WI. The station, scheduled to officially open on May 10, includes one 15,000-gallon LNG storage tank, two LNG fuel dispensers and three dual-hose CNG dispensers. Designed by GP Strategies Corp., the fuel station will serve Kwik Trip's LNG and CNG powered vehicles and private fleets. In addition, members of the public who own alternative fuel-powered vehicles can also fill up at the fuel station. Prior to this project, the La Crosse, Wis., area did not have LNG or CNG fueling availability. LNG and CNG have received much more attention in 2012 due to rising oil prices. It is likely Kwik Trip will offer more LNG and CNG fueling stations in the future. Earlier this year, Kwik Trip President and CEO Donald Zietlow told an industry gathering that the 385-store chain is looking at natural gas as a potential alternative fuel for both growth and staying power. In addition, the convenience store and truck stop chain recently commissioned a survey in Minnesota on SurveyMonkey where it asked fleet purchasing managers about their interest in alternative fuels. As an introduction to the 10-question survey, Kwik Trip stated: "As average diesel prices continue to climb higher, Kwik Trip plans to offer alternatives in order to continue serving our customers and communities in the most effective way possible." This survey placed a special emphasis on LNG and CNG options, **since currently, these are the most economical and proven alternatives.** "Since we will be offering natural gas at some of our truck stop and city locations in the future, it is important that we raise awareness about this fuel as well as any alternatives that our customers request."

Aloha Petroleum Ltd., operator of Aloha Island Mart stores, and technology solutions provider AeroVironment unveiled Electric Vehicle (EV) DC fast chargers at three of the convenience retailer's locations in Hawaii. The Aloha Petroleum charging stations are part of the Hawaii EV Ready Grant Program, which received American Recovery and Reinvestment Act funds to accelerate the adoption of electric vehicles and limit the state's dependence on petroleum. The program calls for the installation of 200 EV charging stations at more than 80 locations statewide. "With the opportunity to recharge in less than 30 minutes, it's easy for drivers to stop at one of Aloha's convenient locations, plug in and charge up while grabbing a snack or a cup of coffee." (H-m-m-m-m-m … do you need to add that customer lounge or QSR seating area? Do you have space? Do you have the money? Can you afford not to!!?)

7-Eleven opened fast-charging electric vehicle (EV) charging stations at four Illinois Tollway Oasis locations last March – advertised as the largest network of fast-charging EV stations in the nation. Fast-charging EV stations are designed to allow motorists with electric vehicles to charge their cars in less than 30 minutes. The Chicago area now has 26 fast-chargers installed, with 47 more planned for the near future. The city of Chicago has an ultimate of goal of opening 280 fast-charging EV stations in dense residential and other high-traffic areas, and has set aside $8.8 million to support that goal. (No word on where they're getting the money for this, since both Chicago & IL are broke. But this is Obama country … $8.8 million – or more if needed – is pocket change.) 7-Eleven opened its first electric vehicle charging station in San Bernardino, Calif., in July, 2011.

Iron Eagle Technologies opened four electric vehicle charging stations in Elkhorn, IA, a town of 650 roughly 75 miles west of Des Moines, in Nov. 2009. The project is the first in the state, and the only charging stations available to the public from Chicago to Denver. They'll be necessary, and you'll see them expand across the nation," said Trevor Schroeter with Iron Eagle. "California is full of them right now." Customers can pull up to the station, flash a special key and plug in their car, Schroeter said. The cost is $2 to $3, and it will take three to seven hours to "fill up." The charging stations cost $6,000 each, and are networked with others around the country. Per other sources, installation of fast-chargers that would cater to c-store customers run around $35,000. (This is a pioneering industry – you can expect a wide range of prices and costs as the industry develops. As in all pioneering ventures, they'll be winners & losers.) Users can use Google Maps to locate stations and find out which ones are in use at any given time, the report stated.

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A small Scottsdale company will play a major role in the biggest-ever U.S. launch of EV charging stations after being handed nearly $100 million in stimulus grants to build charging stations 3 years ago (Aug. 2009). Ecotality Inc., which owns Electric Transportation and Engineering Corp. will roll out 12,800 charging stations in Arizona, Washington, Oregon, California and Tennessee with the grant. One of the project partners is BP America Inc. which could see charging stations installed at some Arizona AM/PM gas stations. (This announced prior to BPs subsequent announcement that it was selling all its assets in the southwest U.S. … recently announced completed with Tesoro. Adding charging units may not be at the top of the list of things to do.) The plan for Arizona is to have 1,000 home charging stations; 1,000 public stations at stores, movie theaters, restaurants and parking garages; and 250 quick-charge public stations that can replenish 80 percent of a battery's power in 15 minutes.

Renewable Electrical Energy – The Myth.

True or false? Battery-powered cars are the answer to our energy and environmental woes. We can produce as many as we want and power them with renewable sources of energy. It's the perfect scenario for energy independence and a much greener planet. Given that many battery-powered vehicles will use lithium-ion batteries (your cordless drill and computer already do), the answer is false. Oh, there's plenty of ions alright. It's the lithium we have to worry about. By some estimates, we would exhaust the world's supply of lithium building six million small cars a year (10 per cent of the world's total) with lithium-ion batteries. Lithium (Li) is a mineral and is the lightest metal. Most of it is found in Chile, Argentina and Bolivia which has more than half the world's lithium deposits, according to US Geological Survey. It is the 31st most abundant element on earth. Lithium will likely not contribute to U.S. energy independence given most of the world's supply is locked away in South America. (Source: An oft-cited study by William Tahil, Research Director of Meridian International Research) Mr. Tahil goes on to say, "The total amount of lithium metal required to make 60M PHEV20s (hybrid electric vehicles with a 20 mile range) with a small 5kWh LiIon battery would therefore be 90,000 tons - nearly 5 times current global Lithium production,"

Another challenge for technological innovation. Might all the EV charger stations be pre-mature?

Evolution Fuels Inc. executed a letter of intent to enter into a lease agreement for its second branded ethanol fuel station in Dallas. The planned product offering includes E10 (10 percent ethanol blended with 90 percent petroleum gasoline), E20, E30 and E85, as well as B20 (20 percent biodiesel blended with 80 percent petroleum diesel. The company's plan calls for the development of a chain of renewable fuel stations extending from Texas to Mississippi

Pearson Fuels currently operates 11 ethanol stations in California, and with its 2009 infusion of $10.9 million from federal and state grants, the company is expanding by an additional 55 stations around the state. California is under pressure by the federal government to increase its output of renewable fuels, and a new federal mandate requires 36 billion gallons of fuel sold in the United States be from renewable sources by 2022 (what I term “legislated demand”) – CA’s share is expected to be 20 percent, the report stated. The Pearson stations are essentially a single Pearson-branded

ethanol pump and underground storage tank at existing gas stations, and the fuel is E85 -- 85 percent ethanol and 15 percent gasoline. The coming innovation of ethanol production will not be from food, but biowaste. Per Mike Lewis, general manager of Pearson, "You hear about making ethanol out of something other than corn – almost none of that is really happening in the real world. We feel AE Biofuels of Cupertino, a company that's close to commercializing "cellulosic ethanol" from corn stovers, are further along than anyone," Lewis said in the report. "Our intention is to bring in non-corn ethanol by the end of 2010." (We've found no follow-up report to say that this commercialization has indeed happened.)

Your Station

The economic, technological, and environmental alternatives to conventional fuel (gasoline & diesel) bring into question the viability of today's traditional gas station. It would seem apparent that economic obsolescence won't show up tomorrow, but the strategic consideration of our conventional station certainly would seem up for review. The most recent property configuration change in the station was from mechanical service bays to convenience stores, as memory serves, about 40-45 years ago. Those of you owning or buying stations today may want to extend your planning horizon to allow for any of the numerous configuration changes mentioned, or unmentioned, in this *Blue Paper*. Space planning (size of the lot, and/or building) will come into play, as will financial planning. And, fortunately or unfortunately depending on how you look at it, government intervention must be considered a factor. In fact, it can be argued that the government's role in this arena is the greater of the uncertainties … not whether federal, state and local governments will encourage or dictate outcomes, but how will they.

So, are you ready to "upgrade" your station for alternative energy … renewable energy … natural gas? Maybe add EV recharging stations? If so, did you know … in 2009, The Central States Air Resource Agencies, through its Blue Skyways Collaborative, is partnering with the U.S. Environmental Protection Agency to initiate a Green Gas Stations Pilot Program in 14 states, including AZ. The program provides $15,000 in funding for gas stations/convenience store owners. (I assume the funding is in the form of a grant, but the research source didn't specify.) The intent is to improve retailers' environmental impact by contributing to the expansion of the infrastructure for alternative fuels, improve energy efficiency and increase the use of renewable energy at gas stations/convenience stores. (Note that the stated intent is not to improve your bottom line!) There you go! I don't know the cost of adding a CNG facility or fast charging EV units, but you might want to check it out. I'd start by finding a contractor. If they work in this field, they'll know your point of contact for the money.

Thank you for your attention,

MJG Gas Station Institute