PARKS PATON HOEPFL & BROWN

ENERGY INVESTMENT BANKING, LP

MUSINGS FROM THE OIL PATCH

October 12, 2010

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

China And Conventional Wisdom: Always Right?

There is a force at work that will alter China's economic trajectory

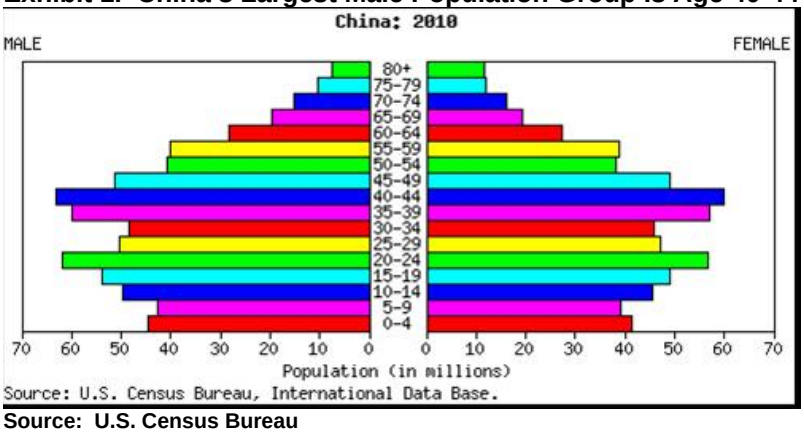
Conventional wisdom in the energy business is that future global demand will be driven by China. That view is predicated on the rapid growth of China's population, now the greatest in the world, along with its growing middle class that is demanding modern conveniences and luxuries, especially automobiles. While most industry observers and investment gurus focus on the growth of the Chinese economy as estimated from its government's economic data pronouncements, there is a force at work that will alter the country's economic trajectory. That force is the demographics of the Chinese population. It is a force that not many people pay attention to, which is surprising given its potential to alter the future growth rate of the world's second largest energy consumer according to the International Energy Agency (IEA).

Demographics project this most productive labor force segment will contract, starting relatively soon

China's demographic profile suggests that the country's population is rapidly aging to the point that in the foreseeable future its population will begin shrinking. The health of the Chinese economy has depended upon its large youth population and that group's impact on the nation's work force and economic prosperity. Demographics project this most productive labor force segment will contract, starting relatively soon. The aging phenomenon is compounded by the government's single child policy enforced over the past 30 years. The one child policy that is still adhered to today dooms China to a future labor force characterized by progressively fewer workers supporting more aging and retired workers.

Today, China has a population of roughly 1.33 billion people. The country remains the most populous in the world, but in little more than a decade it will yield that title to India. The shift is due to

Exhibit 1. China's Largest Male Population Group Is Age 40-44



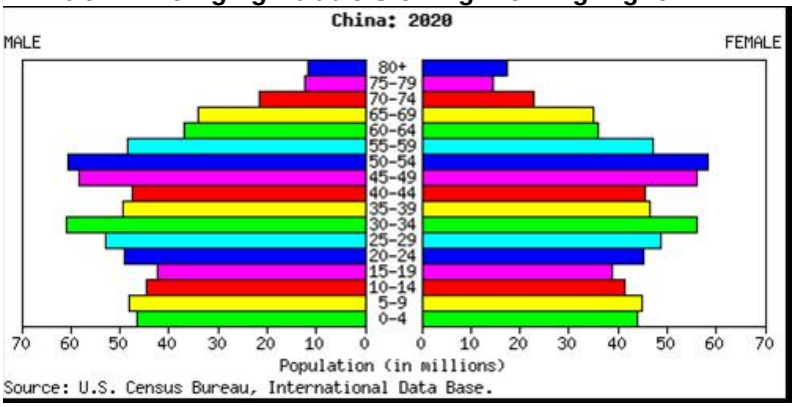
Source: U.S. Census Bureau

changing population dynamics that will alter China's economic outlook and social dynamics. It will change the country's position within the global ranking of countries. Taken together, these new dynamics suggest the possibility of a serious crisis for China.

The aging of China's population may be one of the most dramatic events in world history

The aging of China's population may be one of the most dramatic events in world history. In a little over 15 years the country's population aged 60 and older will increase dramatically, growing by 100 million (from 200 million to 300 million). As Dr. Wang Feng, a professor of sociology at the University of California put it, "The aging of China's population represents a crisis because its arrival is imminent and inevitable, because its ramifications are huge and long-lasting, and because its effects will be hard to reverse."

Exhibit 2. The Aging Bubble Slowing Working Higher



Source: U.S. Census Bureau

China will be forced to reallocate resources to medical expenses and pensions

China's rapid economic growth, both the marvel and envy of other world economies, has been driven over the past three decades by the availability of a cheap and willing young labor force. As that labor force ages, China will be forced to reallocate resources to medical expenses and pensions. From an energy perspective, an aging population will require less energy for support, at the same time government resources are being diverted to social needs.

Those trends will produce an economic growth model the country has never experienced before

The two major impacts of China's demographic trends are that it will have a declining labor force and increased public and private spending obligations. Those trends will produce an economic growth model the country has never experienced before in its long and illustrious history. The example most closely aligned to the Chinese outlook is the experience of Japan whose economic stagnation may be tied closely to its aging population.

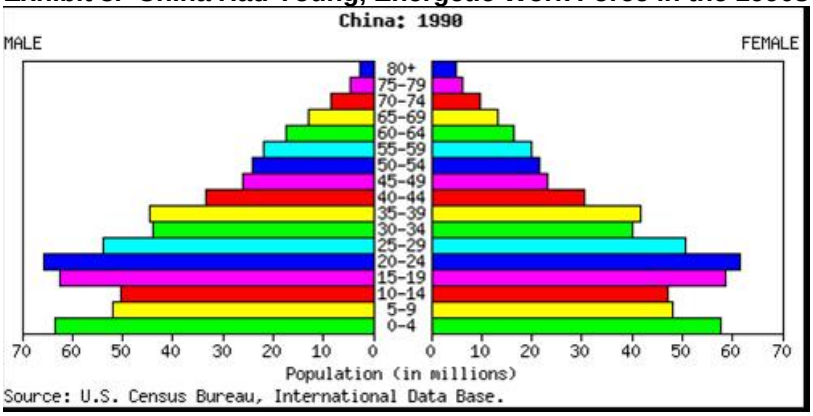
China has less time to prepare its social and economic infrastructure to deal with its rapidly aging population

The new demographic era for China has been marked by a decline in the nation's total fertility rate (TFR), which reflects the number of children borne by a woman during her childbearing years. The TFR decline has been dramatic. In one decade, 1970 to 1980, the TFR was more than halved, from 5.8 to 2.3, a record unmatched by any country elsewhere. In contrast to Western Europe where it has taken 75 years or longer to reduce the TFR from 5 to the replacement level (2.01), China had achieved this reduction in a span of two decades. As a result of this dramatic change in the country's fertility rate, China has less time to prepare its social and economic infrastructure to deal with its rapidly aging population.

The demographic dividend is estimated to have accounted for 15% to 25% of China's economic growth between 1980 and 2000

One of the most important factors in China's spectacular economic performance during the past few decades has been the non-repeatable historical phenomenon of a large and energetic youth work force arriving at the exact time the county's economy was preparing to take-off. The term "demographic dividend" refers to gains or losses in per capita income brought about by changes in a population's age structure. The demographic dividend is estimated to have accounted for 15% to 25% of China's economic growth between 1980 and 2000.

Exhibit 3. China Had Young, Energetic Work Force in the 1990s

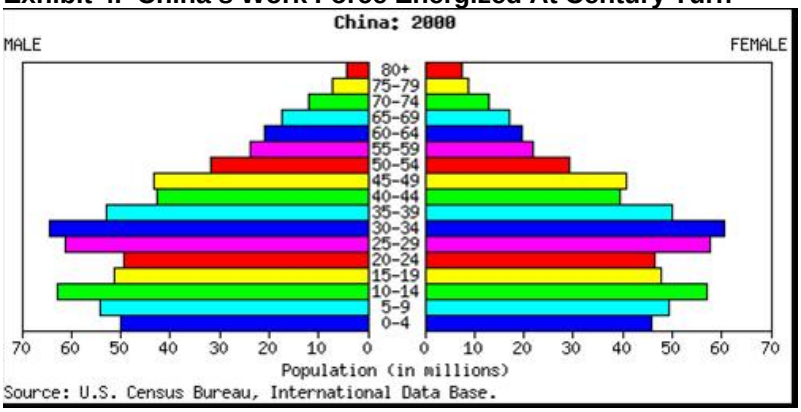


Source: U.S. Census Bureau

Between 1982 and 2000, China's support ratio (the relationship of the number of effective producers to the number of effective consumers) had a growth rate of 1.28%. During the same period, the World Bank's estimate for per capita annual income growth was 8.4%. This means China's demographic dividend accounted for 15% of China's economic growth during the period. Today, the net gain due to favorable demographic conditions has

shrunk to only one-fifth of the average level experienced in the earlier period.

Exhibit 4. China's Work Force Energized At Century Turn



Source: U.S. Census Bureau

It is estimated that by 2013, China's demographic dividend growth rate will turn negative

It is estimated that by 2013, China's demographic dividend growth rate will turn negative. That means that the growth rate of net consumers will exceed the growth rate of net producers. Such a negative growth rate will reduce the country's economic growth rate by at least half a percentage point per year. According to demographic analysts, between 2013 and 2050, China will not fare demographically much better than Japan or Taiwan, and will fare much worse than the United States and France.

Over the 10-year period 2016 to 2026, the size of this population age group will shrink by a quarter

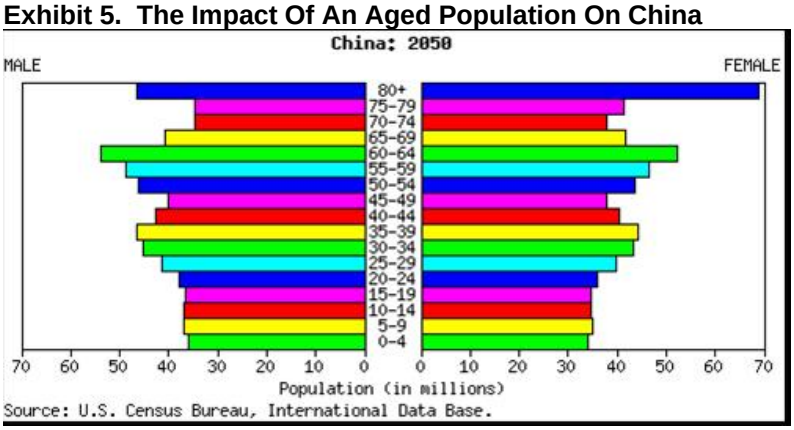
The number of workers aged 20 to 29 will stay about the same for the next few years, but then decline precipitously beginning in the middle of the coming decade. Over the 10-year period 2016 to 2026, the size of this population age group will shrink by a quarter to 150 million from 200 million. For Chinese aged 20 to 24, the decline will come sooner and will be more drastic – falling from 125 million to 68 million, or nearly a 50% reduction. As the young population shrinks, domestic consumption may also retreat as this group is an active consumer.

In the future China may have 20 to 30 million men who will not be able to find wives

The outlook for China's population is not particularly bright. With the current TFR of 1.5, future generations will each be 25% smaller than the one preceding it. It means that China's population is likely to peak in less than 15 years and below 1.4 billion people and then begin a prolonged decline and a period of accelerated aging. The declining population, coupled with the one child policy, means that in the future China may have 20 to 30 million men who will not be able to find wives. This may constitute a large group of unhappy, dissatisfied people. How they will react to the social sentence they are condemned to live out is unknown. Likewise, the aging population will add to the pressures on fragile families as older people see their children die leaving them at the mercy of the state for financial support.

China has already seen some of the ripple effects of its aging

Exhibit 5. The Impact Of An Aged Population On China



Source: U.S. Census Bureau

Where once getting into universities was a matter of intense competition, now the number of applicants has dropped

demographic. In 1995, primary schools nationwide enrolled 25.3 million new students. By 2008 that number had shrunk by one-third, to only 16.7 million. In 1990, China had over 750,000 primary schools. By 2008, the combination of low fertility rates and educational reforms reduced the number of primary schools to 300,000. Where once getting into universities was a matter of intense competition, now the number of applicants has dropped in the past several years.

So what does China's looming demographic crisis mean for energy and oil consumption? Energy consumption in China has dominated the discussion and analysis surrounding the outlook for global oil markets. The focus on China was triggered by the surprise in oil consumption in 2004 when the country increased its use by nearly one million barrels per day in contrast to the forecast by the International Energy Agency (IEA) for growth more in the two to three hundred thousand barrels a day range. The abnormal growth appears to have been the result of China's preparations for the Olympics.

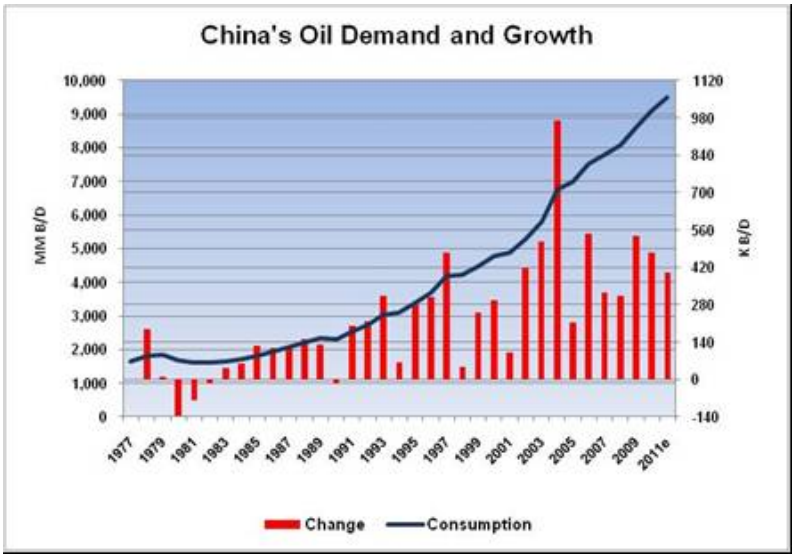
China's oil demand actually grew at a more modest rate – 300,000 to 500,000 barrels per day – than forecast

Following on the climb in oil consumption that began in the late 1990s, which was only interrupted by the economic contraction of 2001, the acceleration in demand in 2004 sent analysts scrambling to revise all their forecasting models. As analysts are prone to do, their revised models became extensions of the consumption increase trend. As we discovered in the second half of the decade, China's oil demand actually grew at a more modest rate – 300,000 to 500,000 barrels per day – than forecast.

China's automobile intensity is less than 50 per 1,000

China's oil consumption growth has been tied to the country's population growth, its growing middle class and its booming export-driven economy. In contrast to the United States where there are approximately 800 cars per 1,000 people, China's automobile intensity is less than 50 per 1,000. A recent J.D. Power & Associates study forecast 2010 automobile sales of 15.8 million units, up from 13 million in 2009. That sales rate makes China the world's largest car market, accounting for 25% of the global total.

Exhibit 6. China's Oil Demand Growth Has Not Matched 2004



Source: BP, IEA, PPHB

For the past 15 years, China's automobile market growth has been driven by "first tier" cities such as Beijing, Shanghai and Guangzhou

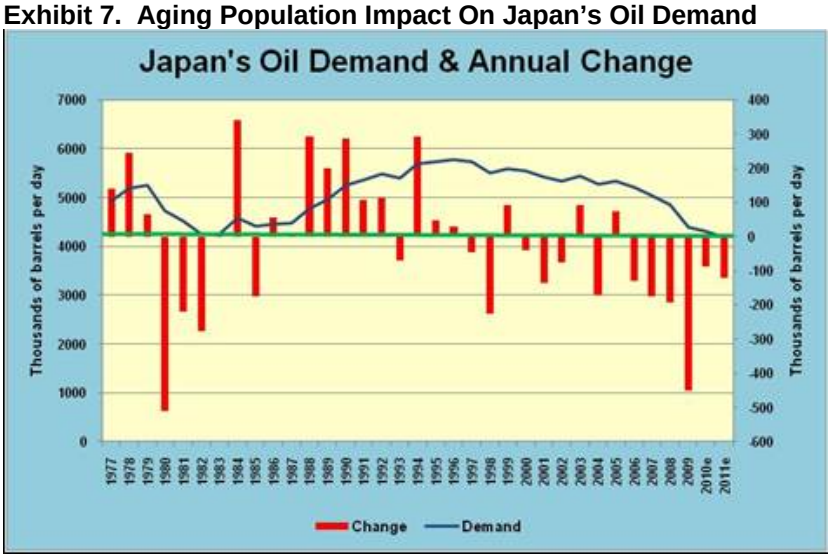
The study pointed out that for the past 15 years, China's automobile market growth has been driven by "first tier" cities such as Beijing, Shanghai and Guangzhou, but now the growth is coming from the country's 32 "second tier" cities. While these cities lack the high profile of the first tier cities, many of them are more populous than New York City or Los Angeles, but they do contain more "price conscious" consumers. Due to this characteristic, older models with less technology are more popular, which helps explain why automobile manufacturers, of which there are more than 100 in China, find their profits under pressure.

The question for energy analysts is to project the penetration of autos into the Chinese society. At the same time, the growth in the auto fleet has contributed to serious traffic congestion, capped by the media focus on the colossal traffic jams outside of Beijing this summer. The push by China to develop an electric vehicle industry coupled with a push for smaller more fuel-efficient vehicles will mute the impact of autos on the country's oil demand growth rate.

Japan hit the demographics wall making it one of the oldest and now slowest growing major economies in the world

Besides that, China's population demographics point to a slowing in oil consumption as the economy's growth rate slows. Aging populations are not huge energy consumers. The most interesting comparison is to examine the growth in China's oil demand since the late 1970s with that of Japan. At one time Japan's economy was recognized at the fasting growing and led to predictions that Japanese companies would take over the world's economy. But the country hit the demographics wall making it one of the oldest and now slowest growing major economies in the world. The impact on the growth in oil demand is dramatic as that country's consumption has been largely negative for the past 15 years as the aging population has dominated the economy.

Exhibit 7. Aging Population Impact On Japan's Oil Demand



Source: BP, IEA, PPHB

"The looming demographic crisis will largely define China in the twenty-first century"

Could China be on a similar path over the next 10-25 years? We think that is a possibility, something that seems not to have entered the discussion about the long term future of the global oil industry. We believe the Chinese government's push to develop "green" energy and its electric power industry fueled by coal, nuclear and alternatives may blunt the growth in oil demand. As Dr. Feng put it, "The looming demographic crisis will largely define China in the twenty-first century." That suggests the conventional wisdom about the future of China's economy, its current trajectory and the growth in oil demand may need to be reassessed.

Oceana Wants To Duplicate Europe Wind Development In US

As with many reports by advocacy groups, they end up advocating rather than analyzing

A new study by conservation advocacy group, Oceana, claims that offshore wind could generate 30% more electricity on the U.S. East Coast than could be generated by the region's untapped oil and gas. According to the study, offshore wind is better than, well everything including sliced bread. As with many reports by advocacy groups, they end up advocating rather than analyzing so their conclusions are often questionable. In the case of environmental advocates, we tend to find their conclusions idealistic rather than realistic.

In practical terms, wind will provide barely over 4% of the UK's total electricity consumption

The new Oceana report arrived about the same time a press release announcing the inauguration of the 300 megawatt (MW) Thanet wind farm off England's south east coast. The release highlighted that the UK now has 5,056 MW of wind energy generating capacity installed – 1,341 MW offshore and 3,715 MW onshore. This capacity comes from the installation of 3,076 utility-scale wind turbines (2,640 onshore and 436 offshore). While an impressive achievement, in practical terms, wind will provide barely over 4% of the UK's total electricity consumption while other renewables provide an additional 5%.

The implication is that the UK has room for many more turbines

The sponsors of wind energy highlight not only the industry's achievement, but also its potential. In terms of density, the UK has one turbine per 100 square kilometers of land onshore. This density measure compares to Denmark's 11 turbines per 100 square kilometers and six turbines in each of Germany and the Netherlands. Spain, one of the world's leading renewable energy countries, has only three turbines per 100 square kilometers while Portugal and Ireland have only two. The implication is that the UK has room for many more turbines.

On average, due to better wind conditions, a UK wind turbine generates roughly 50% more electricity than a similar wind turbine in Germany. Due to this performance difference, Germany has 21,315 wind turbines compared to the UK's 3,076. The UK's wind turbines fleet is projected to grow in the next few years as there are currently 2,576 MW, or an additional 966 turbines, under construction. If one considers future wind generating capacity, there are a further 6,166 MW, or 2,311 turbines, being planned for the UK.

"Renewable energy generally and wind energy in particular is not alternative energy any longer – it is absolutely mainstream"

Attitudes regarding renewable energy in Europe are considerably different from those in the United States. According to a statement from RenewableUK's CEO Maria McCaffery MBE, "Renewable energy generally and wind energy in particular is not alternative energy any longer – it is absolutely mainstream." She went on to state that the significance of the installation of 5 GWs of wind energy generating capacity in the UK is that it is close to the industry's 2010 target. Equally important is that each successive GW of installed generating capacity has taken less time to deploy.

Exhibit 8. UK Leads In Offshore Wind Energy

Country	Total Installed Wind Capacity 2009 (MW)[20]	Offshore Wind Installed Capacity 2009 (MW)[21]
UK	4,051	882.8
Denmark	3,465	639.2
China	25,805	102
Germany	25,777	42
United States	35,064	0
Spain	19,149	0
India	10,926	0
Italy	4,850	0
France	4,492	0
Portugal	3,535	0
Rest of World	21,391	491.9
Total	158,505	2,157.9

Source: Global Wind Energy Council and European Wind Energy Association, 2010[22]

Source: Oceana

Despite the UK's great success in developing wind power it has a

fraction of the total installed wind generating capacity of the U.S. Where the UK does lead is in the offshore wind category. And it is on the offshore wind business that Oceana focused, largely we suspect, because East Coast residents are not particularly friendly toward onshore wind turbines.

Recently, the parties amended their PPA saying that the project will not generate electricity before 2016 due to the reorganization of the former Minerals Management Service

We have a number of issues with the Oceana report. For example, when the authors discuss the price of offshore wind energy, they base it on the 2007 NRG Bluewater power purchase agreement (PPA) with Delmarva Power. The price was reported as $0.10 per kilowatt-hour, which the study's authors conclude is in line with the current cost of alternative electricity supplies. The problem is that this project has not been built. Recently, the parties amended their PPA saying that the project will not generate electricity before 2016 due to the reorganization of the former Minerals Management Service. This delay suggests the Delaware project is dependent on an offshore lease sale for wind acreage, the planning for which has not begun. Until the reorganization of the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) is complete little in the way of new offshore leasing will go forward. So by 2016, what will the price of offshore wind-generated electricity be?

Exhibit 9. Wind Energy Cheap, But Offshore Expensive

Energy Source	Theoretical US Potential (GW)[31]	US Installed Capacity (MW)	Cents per kWh
Solar	217,000	1,111	12¢ - 81¢
PV	206,000	1,106	21¢ - 81¢
CSP[32]	11,100	5	12¢- 18¢
Wind	14,000	35,239	4¢ - 15¢
Onshore Wind	8,000	35,159	4¢ - 7¢
Offshore Wind	6,000 [33]	0	10.6¢ - 13.1¢ [34]
Small wind	140 [35]	80 [36]	15¢ [37]
Geothermal	563	3,040	6¢ - 10¢
Wave	240 [38]	0.12 [39]	24¢ - 86¢
Hydropower	140	77,450	2¢ - 5¢
Biomass	78	11,943	5¢ - 12¢
Tidal	30 [40]	0	18¢ - 35¢
Ocean Current[41]	25	0	Unknown

Source: Oceana

According to the table in Oceana's study on the cost of alternative energy, offshore wind should cost between $0.106 and $0.131 per kilowatt-hour. The two offshore wind projects closest to be built – Cape Wind offshore Massachusetts and Deepwater Wind off Block Island – have agreed to PPAs with power prices of $0.188 and $0.24, respectively. If we use the average of the two ($0.214)

Wind power becomes the highest cost fuel source at $2,358 compared to oil at $2,259 and coal at $1,360

(both are being challenged in the courts and regulatory bodies) to determine the annual cost of electrifying a house as presented in another table in the Oceana study, wind generated electricity is 76% greater than estimated and wind power becomes the highest cost fuel source at $2,358 compared to oil at $2,259 and coal at $1,360. Our average cost figure reflects the federal government's production tax subsidy. Wind power is the highest cost fuel source when real, rather than hypothetical project economics are considered.

Exhibit 10. Wind Not Cheap If Real Costs Used

Annual Fuel Cost	Oil	Natural Gas	Wind
Heating One Home	$1,683	$627	$307
Electrifying One Home	$2,259	$1,360	$1,341
Powering One Home	$2,261	$544	$503

Source: Oceana.
Based on MMS estimates of undiscovered, economically recoverable oil and gas resource at $110/barrel, $11.74/mcf, and DOE estimates for offshore wind costs ranging from 10.6 – 13.1 ¢/kWh. Heating based on DOE estimates of average homes using this fuel as primary space heating fuel. Electrifying based on 10,810 BTU per kWh from oil and gas and 11,020 kWh consumed per home annually. Car estimates based on 31.5 MPG gasoline, 121.5 cubic feet natural gas per gallon equivalent, 2.9 miles per kilowatt hour and 12,000 miles driven annually per car. See Oceana Technical Notes for methodology, available at www.oceana.org/cleanenergy.

Source: Oceana

Have the authors of the study considered how much offshore water will need to be populated with wind turbines?

Another problem with the Oceana study is its statement, "A modest investment in offshore wind could supply almost half the current electricity generated on the East Coast." The report neither addresses the amount of investment nor the cost of offshore wind turbines. When you look at the section of the study discussing turbine manufacturers, the actual units available today can generate less than 4 MW. If we use that turbine capacity, then as shown in Exhibit 11 below, to tap all the economically recoverable wind offshore Delaware, we would need to install over 700 turbines. Virginia would need 4,000 turbines and Massachusetts almost 4,500. Have the authors of the study considered how much offshore water will need to be populated with wind turbines? It will be thousands of square miles of offshore waters. What impact does that have on shipping, fishing and recreation, let alone the cost of building and maintaining the turbines?

Offshore wind turbines need to be much larger and stronger (more costly) to withstand the greater wind speeds, weather and wave action than near-shore installations. These installations will require more costly bases for support and larger equipment to install them. None of these hurdles were addressed by the study, maybe because they become inconvenient problems in the myth of offshore wind.

Exhibit 11. Has Oceana Calculated Turbines Needed?

Rank by Percent of Electricity Wind Can Provide	State	Percent of State Electric Generation Potentially Supplied by Offshore Wind	Economically Recoverable Offshore Wind Resource (MW)	Percent of State Electricity Supplied by Fossil Fuel (2008)	Primary Source of Electric Energy (2008)
1	Delaware	137%	2,850	91.3%	Coal (70%)
2	Massachusetts	130%	13,800	80.6%	Natural Gas (50.6%)
3	North Carolina	112%	37,900	64.1%	Coal (60.5%)
4	New Jersey	92%	16,000	47.3%	Nuclear (50.6%)
5	Virginia	83%	16,000	56.1%	Coal (43.7%)
6	South Carolina	64%	19,200	47.0%	Nuclear (51.3%)
7	Rhode Island	38%	739	97.8%	Natural Gas (97.4%)
8	Maryland	36%	4,660	62.3%	Coal (57.5%)
9	Florida	16%	10,300	82.1%	Natural Gas (47.1%)
10	New York	12%	4,730	47.7%	Natural Gas (31.3%)
11	Georgia	3%	1,190	73.2%	Coal (62.8%)
	Total	48%	127,389	64.9%	Coal (39%)
	Maine	913%	38,900	48.4%	Natural Gas (43.2%)
	New Hampshire	21%	1,230	46.6%	Natural Gas (30.9%)

Source: Oceana

Wind power supporters fail to recognize that these turbines have, at best, a life of 20 years

Lastly, wind power supporters fail to recognize that these turbines have, at best, a life of 20 years. That becomes a significant issue when comparing the cost of wind (an intermittent power source) with the steady power from a generating plant powered by coal, gas or nuclear that will last 40 to 50 years. Over looked is that the modest cost of offshore wind farms has to be replicated within 20 years. Wind may be popular today among environmentalists but it appears to fail the economics test.

The Hidden Cleantech Revolution Covers Energy Issue Well

A new book, The Hidden Cleantech Revolution, written by an experienced energy executive and investor and an energy industry analyst, address how this country can manage the transition to a more secure energy future

Volatility in energy prices reflects the high degree of uncertainty about future energy supply and demand. At the same time we are dealing with energy supply uncertainty, securing our energy infrastructure remains a significant challenge but is not receiving quite the same attention. How at risk is the U.S. electricity grid to brownouts or blackouts? Could recent pipeline leaks be a precursor of major pipeline breaks that might disrupt the flow of oil and gas throughout the country? How much risk is our economy at from terrorist attacks disrupting Middle East oil flows? Could another Hurricane Katrina devastate the Gulf Coast refining industry? Questions such as these highlight the risk of energy infrastructure failures on the U.S. economy. The response to these concerns is to push for greater U.S. energy independence and for more homegrown renewable energy supplies. A new book, The Hidden Cleantech Revolution, written by an experienced energy executive and investor and an energy industry analyst, address how this country can manage the transition to a more secure energy future.

John Moore, the chief executive officer of Acorn Energy, Inc. (ACFN-NASDAQ) and an investor in energy technology companies, and Toby Shute, an energy and natural resource analyst for Fool.com, have written a book demonstrating that the most realistic approach for securing the nation's energy and environment is by using already existing Cleantech technology available within our energy systems. In other words, we should be working to improve energy productivity and not merely cutting consumption and seeking energy efficiency

gains. Energy productivity can be influenced by innovation in information technology that delivers scalable Cleantech solutions for the current energy sector.

They believe that the investment needs for energy independence are substantial and should be the subject of significant debate and discussion

The authors highlight the problems with most of the renewable fuel efforts – solar and wind power in particular – that prevents them from having more than a negligible impact on our energy supply for at least the next two decades. They believe that the investment needs for energy independence are substantial and should be the subject of significant debate and discussion because the sums needed to be invested may determine both the prosperity along with the security of our nation for the next hundred years. The authors set out in their book to examine these choices and evaluate and rank them.

The questions the authors pose about each technology examined include: Will implementing a particular technology make the production of energy cleaner? Will it make the production and delivery of energy safer? Will it make the production and delivery of energy more reliable? Will it make energy cheaper for the economy as a whole? They then rate the energy sources on a scale of 0-25 for each of the above questions and multiply the resulting total by the degree to which the technology is proven and the impact the technology can have on our energy infrastructure in the next decade. The result is a numeric number for each technology allowing them to be ranked from the most to the least impactful.

They believe we need to think about our energy choices as a portfolio

The thesis of the book is that there are five priorities the U.S. needs to pursue to cost-effectively secure America's energy future. First is to play offense and get more out of the grid and our oil and gas, coal and nuclear fuels. Second is to play defense and invest in the safety, security and resilience of our infrastructure. They believe we need to think about our energy choices as a portfolio. We need diversity of supply and must understand what is happening today without government subsidies in order to choose the lowest cost, lowest risk and highest return investments to secure our energy future.

Each chapter is well annotated with reference sources for those wishing to understand more about the topic

The bulk of the book is set out like a high-level briefing on each topic. This makes the book easily readable and offers the opportunity to skip around to examine fuels and technologies that the reader is interested in without having to plow through the book in a linear manner. Each chapter is well annotated with reference sources for those wishing to understand more about the topic. While this is a valid approach for the average American seeking to understand the energy issue and the various options available, experienced energy professionals may be left wanting more. To keep the topics simple and direct, sophisticated energy investors and practitioners may wish that the authors had gone into greater detail and explanation of their observations. While this could be perceived as a short-coming of the book, for most readers the narrative covers the topics adequately while offering sources for further research if so desired.

Messrs. Moore and Shute have produced a volume that should be required reading by Americans as the decisions to be made by our politicians in the next few years will determine the energy future and security of our economy for years to come

The best thing about the book is that it is available for download free on a web site the authors have established to advance the debate and discussion. The site, www.hiddenCleantech.com not only has a place for comments and discussion but allows readers to download the complete book. The book in hardcopy is only 135 pages long so the download is not too great a burden. Moreover, the set-up of the book with short chapters allows a reader to scan the entire book or just focus on certain sections of interest. Messrs. Moore and Shute have produced a volume that should be required reading by Americans as the decisions to be made by our politicians in the next few years will determine the energy future and security of our economy for years to come. Poorly understood or merely politically motivated decisions that ignore the laws of physics and economics could doom this country to an underperforming future. An underperforming economy will doom future generations to a lower standard of living and a greater level of personal frustration. Let's hope this book stimulates the appropriate debate that is needed for our leaders to understand the correct energy decisions for the benefit of our children and grandchildren.

Chinese HSR Saga Highlights Risk For Auto Technology

The report suggested that foreign auto manufacturers wanting to produce EVs for the Chinese market could be forced to accept a minority stake in joint ventures with Chinese companies and be required to share new EV technology

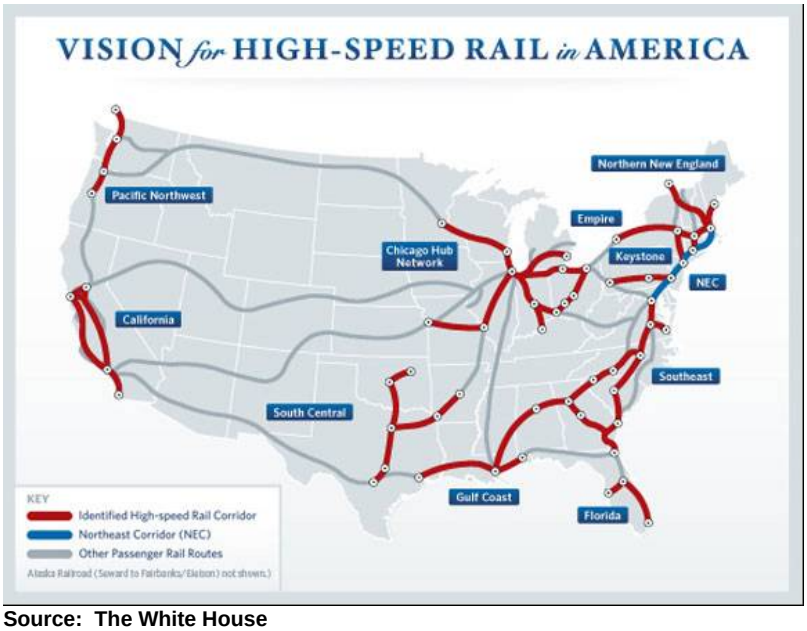
Recently *The Wall Street Journal* reported on a draft proposal from China's Ministry of Industry and Information Technology for making China a leader in electric vehicle (EV) production within 10 years. The report suggested that foreign auto manufacturers wanting to produce EVs for the Chinese market could be forced to accept a minority stake in joint ventures with Chinese companies and be required to share new EV technology. The report spurred U.S. Representative John Dingell (D-MI) from Dearborn, Michigan, to write a letter to Zhang Yesui, the ambassador from the People's Republic of China to the United States, warning that such a plan "may lead to and validate retaliatory action" against Chinese imports.

To understand the significance of this possible move, one must learn the history of China's high speed rail technology development

U.S. car makers already are required to partner with Chinese companies to do business in the country. A former Chrysler executive in their Chinese operations said in a recent radio interview that he felt there was little likelihood this plan would be imposed given the risk that American auto manufacturers might take their EV technology elsewhere. To understand the significance of this possible move, one must learn the history of China's high speed rail (HSR) technology development. The story also has implications for the Obama administration's drive to build a HSR network in this country.

The Obama administration has pledged $8 billion of funds from the 2009 stimulus bill for HSR projects with the possibility that another $2.3 billion will be forthcoming from the recently enacted spending bill. Of the $8 billion allocated, only $597 million has actually been released to HSR projects with another $286 million to be released soon according to *The Wall Street Journal*. The CATO Institute recently estimated that the construction of the proposed HSR

Exhibit 12. Obama Administration's Vision For HSR



Source: The White House

network will cost at least $500 billion. That estimate was derived by examining two HSR projects underway. In California, citizens have approved a 400-mile HSR project connecting San Francisco with Los Angeles. The environmental analysis for the project estimates it will cost $33 billion for a train that can travel as fast as 220 miles per hour (mph) and average 140 mph. In contrast, the Midwest Rail Initiative is estimated to cost $7.7 billion for a moderate speed line some 3,150 miles long. The cost differential between the projects is huge. The HSR project will cost $82 million per mile compared to $2.4 million per mile for the moderate speed line.

The HSR project will cost $82 million per mile compared to $2.4 million per mile for the moderate speed line

The more telling data from the CATO study is that according to the U.S. Department of Energy, an Amtrak train uses 2,700 British thermal units (Btus) of energy per passenger mile traveled, which is better than autos at 3,400 Btus and airplanes at 3,300 Btus. However, autos and planes are improving their efficiency at 2% to 3% per year. For example, a Toyota Prius uses less than 1,700 Btus per passenger mile. In contrast, Amtrak trains have only improved their fuel efficiency by one-tenth of one percent per year during the past 10 years.

Amtrak trains have only improved their fuel efficiency by one-tenth of one percent per year during the past 10 years

To understand the Chinese EV technology move, one needs to learn the history of how China handled HSR technology. The story was outlined in a recent column in the *Financial Times* that detailed the inherent risks in the Chinese HSR strategy. The column pointed out that China is in the midst of conducting an unprecedented experiment in stitching together the world's largest and fastest HSR network from a patchwork of hugely complex foreign and local systems, all developed within the last decade. Problems in this effort could result in deaths as has happened elsewhere. The

column also discussed the "digesting" (the official government term) of foreign HSR technology by Chinese companies and how that effort is viewed by foreign executives. They privately complain that digestion can be a euphemism for abuse. While they are not prepared to challenge the Chinese companies in local courts, those companies, say the foreign executives, should be prepared to face legal challenges in any international markets China tries to enter.

It was imperative that the county's rail network be modernized and the capacity, quality and efficiency of rail transportation be improved due to its importance for the national economy and China's social progress

The story of the Chinese and HSR technology is set forth in a report issued earlier this year by China's state Xinhua news agency and posted on the web site of the state railway company, CSR. The report details how the country achieved 40 years of HSR development in just five years. It begins by noting that Premier Wen Jiabao had instructed the railway company to construct a HSR network numerous times as it was imperative the country's rail network be modernized and the capacity, quality and efficiency of rail transportation be improved due to its importance for the national economy and China's social progress. The railway company recognized that the HSR R&D effort would likely take 20 years. Based on the country's existing rail technology and facilities, in order to grasp the 200-kilometer-per-hour (km/hour) speed technology would take China, working alone, 10-15 years. To extend the technology to 300-km/hour would take even longer.

He did wonder, however, whether 16 years was too short a time period as it had taken Japan nearly 30 years to boost its HSR trains from 210-km/hour to 300-km/hour

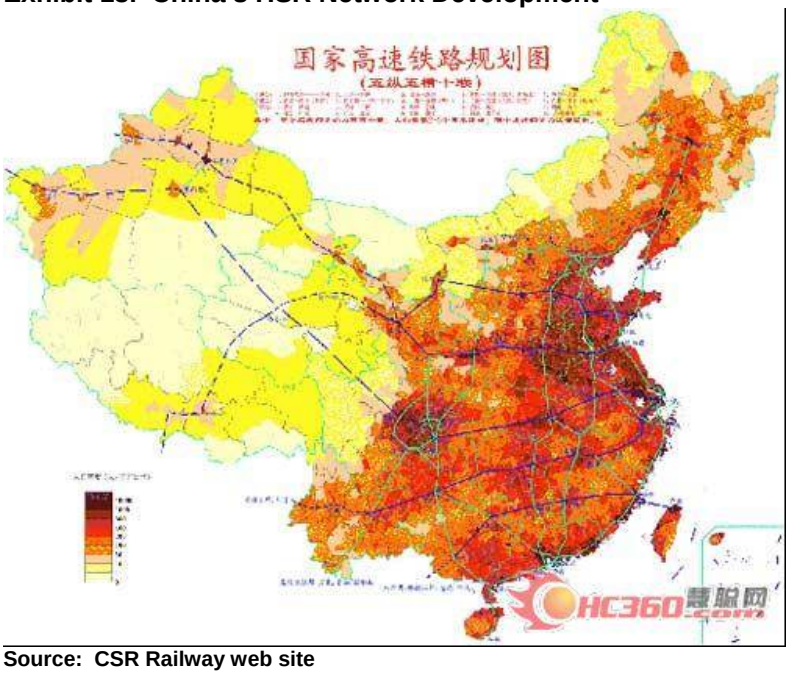
The idea of "digesting" foreign HSR technology would certainly reduce the time frame for China to achieve its rail system goal. To quote from the report, "In January 2004, the State Council executive meeting discussed and endorsed in principle *The Medium And Long-Term Railway Network Plan*, which, in a heroic manner, maps out the 12,000-km-long express passenger rail network with 4 vertical and 4 horizontal lines." The article goes on to point out that at the time of adopting the master plan, the president of Kawasaki Heavy Industries Ltd. of Japan postulated that it would take the Chinese two eight-year periods to achieve the government's goal of grasping the HSR technology – one period to achieve 200-km/hour and another to get to 350-km/hour. He did wonder, however, whether 16 years was too short a time period as it had taken Japan nearly 30 years to boost its HSR trains from 210-km/hour to 300-km/hour.

To appreciate the tenacity of the Chinese for understanding and mastering new technologies, the following discussion demonstrates how the Chinese mastered certain HSR technology despite the best efforts of the foreign supplier to hide it.

From the report: "Each trivial component and technology represents the efforts they have made in the digestion-absorption-innovation process.

"Few CRH passengers will notice a pair of rubber strip wind shields on the exterior joints of carriages, which seem to have little technological content. In 2005 during the joint-design stage, some overseas designers tried to play hide-and-seek game with us.

Exhibit 13. China's HSR Network Development



Source: CSR Railway web site

"'What are the rubber strips used for?' asked the Chinese technicians.

"No big use. Just to prevent the passengers from falling off the platform,' answered them.

"But such a simple explanation has aroused the doubts of CSR Qingdao Sifang technicians.

"'Really so simple? Very strict requirements are made for the rubber strips. Are they just preventing passengers falling off the platform?' they questioned further.

"'Uh, I guess they can also reduce the air resistance.'

"Such hesitant reply still left the technicians in doubt.

"At the beginning of 2006 when the plant received the first batch of prototypes, CSR Qingdao Sifang technicians, after tests and analysis, found that the pair of wind shields can replace the bogie's function of preventing the train from side rolls.

"'Only without neglecting any component and technology is it possible to grasp advanced technologies,' comments DENG Xiaojun, Chief Design Supervisor of CSR Qingdao Sifang."

Recognizing that China would need to master the technology of HSR, the government set forth a strategy that involved digesting and absorbing the advanced technologies offered by foreign suppliers of

To develop this R&D effort, China called upon over 50 academicians, 150,000 technicians and 600 entrepreneurs

HSR systems. With this technology China would build local 200-km/hour to 250-km/hour HSR trains. At the same time the country began its own HSR R&D effort to independently develop 350-km/hour trains and then 380-km/hour ones. To develop this R&D effort, China called upon over 50 academicians, 150,000 technicians and 600 entrepreneurs. Along the way, China has attained over 900 HSR patents, but it is unknown how many of these might be mere copies of western company technology.

That savings, according to the report, translates into a reduction of 10 million tons of coal per year for generating electricity to power the trains

Besides securing a large number of patents, the report told of one project – to reduce aerodynamic drag on their trains – undertaken by a team of academicians from many of the country's leading universities. By removing certain decorations and making some other minor adjustments to the design of the cars, the team was able to reduce energy consumption by 7%. That savings, according to the report, translates into a reduction of 10 million tons of coal per year for generating electricity to power the trains.

The vision is that the vast country of China will become a one-day transportation network

China plans by 2012 to build a HSR network with four horizontal and four vertical rail lines extending over 13,000 kilometers, more HSR mileage than exists in the world today. By 2020, the HSR network will be expanded to over 18,000 kilometers. The plan, when completed, will allow travelers from Beijing to reach most of the provincial cities within one to eight hours. Starting from Shanghai, Zhengzhou, Wuhan and other central cities to the surrounding cities, it will take between half an hour and an hour. The vision is that the vast country of China will become a one-day transportation network.

Additionally, the HSR network will help China in its struggle to control carbon emissions as HSR trains have energy consumption one-sixth that of autos. If electricity is used, the Chinese claim carbon emissions will be close to zero (that claim excludes the emissions of the power plants). The country also sees HSR as a boost to its economy as they believe there could be a nine-to-one payback of the investment from the value of increased economic output.

China believes HSR technology will help push a new round of economic growth for the country

China believes HSR technology will help push a new round of economic growth for the country. Interestingly, the report, entitled "High Speed Rail In China: 5 Years Equals 40 Years" ends with a quote by a former Chinese leader. The summer of 1912 quote by Sun Yat-sen, the founder of modern China, states: "In today's world, no country can develop itself without railways. Without railways, China, as a vast country, cannot boost its industries."

"…a reminder they are dealing with a nation that is no longer willing to be a technology follower and is able to use the allure of its vast market to catch up"

The report's message and the quote demonstrate that China will do whatever it takes to leapfrog the development time for technologies deemed crucial to the country's economic development. As Mure Dickie, the *Financial Times* columnist who highlighted the report put it, "It is a document that should be required reading for any foreign manufacturer doing business in China, a reminder they are dealing with a nation that is no longer willing to be a technology follower and is able to use the allure of its vast market to catch up."

Canada Oil Sands: Trying For A Better Environmental Image

Since President Obama entered office the subject of Canada's oil sands and its environmental impact has been a thorn in the side of U.S.-Canada relations

Since President Obama entered office the subject of Canada's oil sands and its environmental impact has been a thorn in the side of U.S.-Canada relations. First it was the president-elect criticizing the "dirty" oil sands during the election campaign. Then criticisms came from Capitol Hill politicians over the carbon footprint of the oil sands during discussions over building a new pipeline to haul more oil sands bitumen to U.S. refineries along the Gulf Coast. In recent weeks, the debate has been re-energized as some of the leading anti-oil Congressional leaders ventured to Canada. While in Canada, these American politicians agreed to meet with various parties involved in the oil sands development debate. From media reports and comments by people in attendance at these meetings, little progress was made by the supporters of the oil sands in swaying the views of these U.S. politicians, although two U.S. Senators have sponsored a bill to make Canadian oil sands production exempt from any import restrictions.

Speaker of the U.S. House of Representatives Nancy Pelosi (D-CA) and the head of the House energy independence and global warming committee, Edward Markey (D-MA), journeyed to Ottawa for a global political meeting several weeks ago. While there, Mrs. Pelosi had a discussion with three premiers of energy producing provinces, the Canadian environmental minister, and heads of several large energy companies including ones involved in oil sands development and bitumen shipping, and leading environmentalists. She even had a phone conversation with the Canadian Prime Minister Stephen Harper.

Mrs. Pelosi was quoted as saying she doesn't like "fossils" and doesn't care whose it is or where it comes from

It appears from the media accounts of the meeting that the anti-fossil fuel attitude of the ultra-liberal Democratic Congressional leadership was not modified by the discussions. Mrs. Pelosi was quoted as saying she doesn't like "fossils" and doesn't care whose it is or where it comes from. This is from a person who two years ago didn't know that natural gas was a fossil fuel even though she and her husband had invested in gas exploration ventures!

While acknowledging the importance of the oil sands, Mr. Cameron is still not a fan, calling the extraction effort unfettered and appalling

While oil sands promoters have been trying to improve the public image of this important North American energy source, the most recent high-profile personality to criticize the resource was movie director James Cameron of Avatar and Titanic fame. He recently visited Alberta to tour the oil sands and met with Alberta Premier Ed Stelmach. While acknowledging the importance of the oil sands, Mr. Cameron is still not a fan, calling the extraction effort unfettered and appalling. But he did admit in comments to *Time* magazine that "I understand where they're coming from. We need (the oil sands) for energy security. That is something of an epiphany on this trip."

While supposedly not linked, but almost immediately following Mr. Cameron's visit, Canada's Environmental Minister Jim Prentice announced the establishment of an independent panel of leading

Exhibit 14. Hypocrisy Often Overrules Best Intentions

Source: *Globe and Mail* web site

The federal review is being done in response to a recent study that found the Athabasca River with elevated levels of poisonous elements such as mercury and lead

scientists to review environmental monitoring in the oil sands. The review will be quick, a mere 60 days. The announcement of the federal panel caught Alberta by surprise as it had proposed a joint provincial/federal review. The federal review is being done in response to a recent study by University of Alberta biologist David Schindler, who found that the Athabasca River had elevated levels of poisonous elements such as mercury and lead.

That study was followed in the past few days by one conducted by Environment Canada indicating that levels of toxic mercury in the eggs of water birds downstream from the oil sands developments seem to have grown by nearly 50% over the past three decades. While the study does not tie the increased pollution to the oil sands development, it does point to the Athabasca River as a source of some of the mercury.

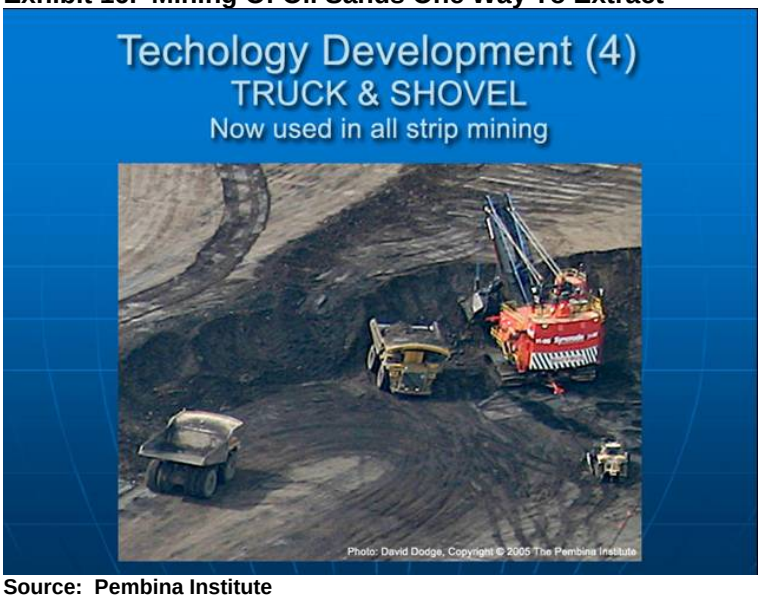
Exhibit 15. Three Oil Sands Deposits

Source: CAPP

With the economically-recoverable oil sands reserves, Canada has the second largest oil reserves (170 billion barrels) in the world

Despite the best efforts of oil sands developers to improve the environmental footprint and perception of the resource, it will likely always remain controversial due to its historic image. The importance of the oil resource cannot be underestimated. With the economically-recoverable oil sands reserves, Canada has the second largest oil reserves (170 billion barrels) in the world, following Saudi Arabia's 260 billion barrels. Estimates are that the three oil sands deposits – Athabasca, Peace River and Cold Lake – may contain as much as 1.7 trillion barrels of oil in place.

Exhibit 16. Mining Of Oil Sands One Way To Extract



Source: Pembina Institute

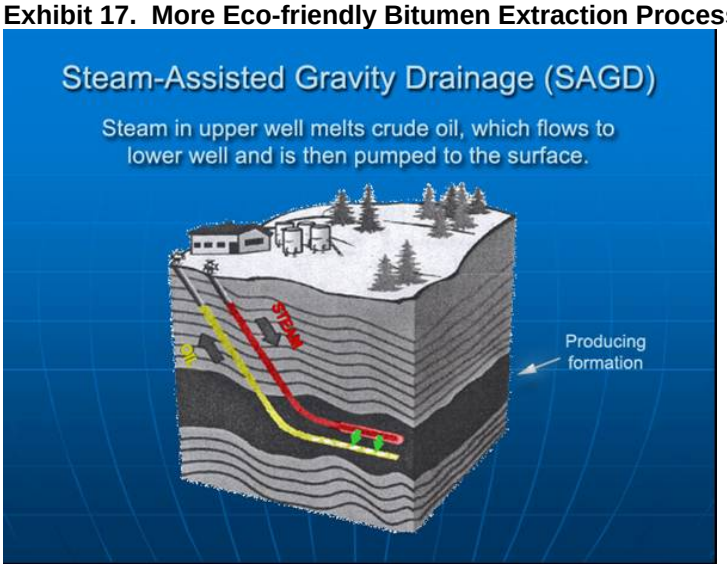
Projected production growth will put pressure on expanding the pipeline capacity to move more bitumen to the U.S.

Production from the oil sands has grown over the years, and given projected spending on new projects, should continue to grow. It currently stands at about 1.3 million barrels per day. Projected production growth will put pressure on expanding the pipeline capacity to move more bitumen to the U.S. or for Canada to invest in upgrading capacity. It is this need for the pipeline expansion that is driving the increased political tension between the two countries. The dirty image of the oil sands output, coupled with dead birds in tailing ponds, has given ammunition to environmentalists and politicians who are anti-fossil fuel such as President Obama and his Democratic leadership pals.

On a well-to-wheel measurement basis, the carbon intensity of the oil sands falls within the range of carbon intensity for other conventional crude-based fuels used in the United States

According to government statistics, the oil sands account for only 5% of Canada's total greenhouse gas emissions. Based on a study by Cambridge Energy Research Associates (CERA), on a well-to-wheel measurement basis, the carbon intensity of the oil sands falls within the range of carbon intensity for other conventional crude-based fuels used in the United States. Importantly, Canada will be producing an increasing amount of its oil sands production from deeper depths using steam-assisted-gravity-drainage (SAGD) as opposed to the well-known strip mining technique. According to the

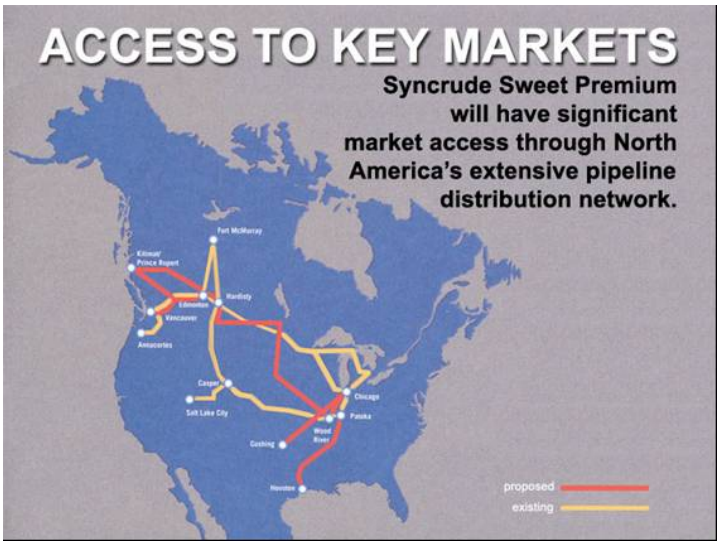
Exhibit 17. More Eco-friendly Bitumen Extraction Process



Source: Pembina Institute

Canadian Association of Petroleum Producers (CAPP) there are 35 billion barrels of mineable oil sands reserves, which are found at depths of less than 200 feet, while there are 135 billion barrels at deeper depths that will be produced by SAGD and variations of that technique.

Exhibit 18. US Needs More Oil Sands Production



Source: CAPP

Watch for the battle over the oil sands to heat up again next year

While the pipeline battle has yet to be settled, the issue will become more acute in the future as major sources of oil supply to the United States from countries such as Mexico and Venezuela decline. Watch for the battle over the oil sands to heat up again next year as the new Congress and the president struggle with energy and environmental legislation.

White House Considers Boosting CAFE Even More

This preliminary proposal is being contemplated as a way to reduce fuel consumption and tailpipe emissions by 3%-6% per year from 2017 to 2025

The Obama administration has announced it is considering boosting automobile fuel efficiency standards to as much as 62 miles per gallon (mpg) by 2025 from the present standard of 35.5 mpg in 2016. This preliminary proposal is being contemplated as a way to reduce fuel consumption and tailpipe emissions by 3%-6% per year from 2017 to 2025. The preliminary proposal was made jointly by the U.S. Environmental Protection Agency (EPA), the U.S. Department of Transportation (DOT) and the California Air Resources Board (CARB).

The first step is a "technical assessment" to be followed in a second step by a regulatory analysis due by November 30th. Then the agencies would begin a discussion with the automobile industry, environmental groups and consumer advocates. The Obama administration would not submit an actual proposal for public comment until September 2011. Only after all comments are received and reviewed would actual standards be adopted.

They suggest that the initial development costs would range between $770 and $3,500 per vehicle

In the technical assessment, the federal government suggests that increased vehicle costs to meet the higher fuel-efficiency target would be offset by fuel savings over the life of the vehicle. They suggest that the initial development costs would range between $770 and $3,500 per vehicle depending upon the targets enacted and which technologies are adopted, but the cost would be offset by fuel savings of between $4,900 and $7,400 per vehicle. Since there are serious doubts about the ability of the automobile industry to develop engines and transmissions that can meet this high a fuel-efficiency target, estimating the costs seems premature and the cost estimates highly tenuous.

An interesting comparison we have seen matches the cost and fuel savings of the Toyota Prius against those of the Honda Fit. The Prius averages 45 mpg and costs about $23,000, while the Honda Fit gets 35 mpg and costs $16,000. If we assume these vehicles are driven by typical Americans, then they will drive 12,000 miles per year. That means the Prius driver will use 267 gallons of fuel while the Honda Fit driver will consume 343 gallons. The 76 incremental gallons of gasoline needed to power the Honda Fit compared to the Prius at a $3.00 per gallon cost means an extra $228 dollars a year.

Are American drivers willing to spend an additional $192 a year in order to drive a more fuel-efficient vehicle?

For the Prius owner the additional $7,000 cost of his vehicle, financed at 6% per year, adds $420 annually to his operating expense. Are American drivers willing to spend an additional $192 a year in order to drive a more fuel-efficient vehicle? With regular gasoline pump prices below $3 per gallon, the verdict appears to be no as Prius and other hybrid vehicle sales are down while less fuel-efficient and larger vehicle sales are up.

Our guess is that this heightened fuel-efficiency standard is merely a means to drive electric vehicle (EV) sales and bolster the Obama

One strategy is to figure out how to sell these more fuel-efficient vehicles at a cost no higher than conventionally-powered vehicles

administration's green energy and green jobs agenda. Automobile manufacturers confronting such a high CAFE standard will be faced with only a couple of business options. One is to figure out how to sell these more fuel-efficient vehicles at a cost no higher than conventionally-powered vehicles. Depending upon the technologies employed to meet the high mpg threshold it may or may not be a realistic goal.

The other strategy is to embrace electric vehicles

The other strategy is to embrace EVs. As the EPA's preliminary method for estimating EV fuel-efficiency suggests extremely high ratings (possibly hundreds of mpg), manufacturing and selling them will become mandatory for auto company success. Of course, by forcing our automobile companies into relying on EVs with their dependence on rare earth minerals, presently 95% controlled by China, we could be setting them off on the road to their bankruptcy.

Possible Double Hit For Rhode Island Offshore Wind Project

The Deepwater Wind project targeted for offshore Block Island, Rhode Island, and expected to be the first commercial offshore wind off the coast of the United States, received one official setback and possibly a second with potentially more devastating consequences. The official hit relates to the legal proceedings from the August decision of the Rhode Island Public Utilities Commission (PUC) to approve the power purchase agreement (PPA) between Deepwater Wind, the developer of the offshore wind project, and National Grid (NNG-NYSE), the local utility, for the surplus power.

The appeals by the first two parties address issues about the constitutionality of the revised law that they believe favored one company

The PPA approval came after the original PPA was rejected by the PUC based on its assessment that it was uneconomic for consumers. The law regarding the PUC's measures for evaluating the PPA was revised subsequently, virtually assuring its approval upon resubmission. Within a week of the PUC's decision, appeals came from the R.I. Attorney General, the Conservation Law Foundation and two industrial power customers. The appeals by the first two parties address issues about the constitutionality of the revised law that they believe favored one company, Deepwater Wind, and the state government's action to force the PUC to hear the same case twice, which violated judicial precedent. The industrial customers challenged the price determination as being too high when cheaper energy supplies were available.

Depending upon the timing of the hearing, its length and the time to render a decision, March is the earliest a final decision could be forthcoming

Appeals of PUC decisions automatically go to the Rhode Island Supreme Court. The Court has just announced it is requesting the lawyers representing the various parties in the case to file briefs on the matter with the last one to be filed by February 3rd 2011. The Court will then schedule a hearing on the matter meaning it most likely will not happen before March of next year. Depending upon the timing of the hearing, its length and the time to render a decision, March is the earliest a final decision could be forthcoming.

In the court's order, it consolidated all the appeals into one case.

The court is also allowing the governor, the Rhode Island Senate president and the speaker of the Rhode Island house to participate in the hearing. What this does, however, is to prevent Deepwater Wind from starting construction of the project, which could impact the ability to secure financing and to secure federal government subsidies.

Deepwater Wind's primary investor, the world's third largest hedge fund, D. E. Shaw & Co., had laid off 150 people or about 10% of its work force

Potentially a more significant hit to the Block Island project was the announcement that Deepwater Wind's primary investor, the world's third largest hedge fund, D. E. Shaw & Co., had laid off 150 people or about 10% of its work force. *Bloomberg News* reported that at the 2008 stock market peak until July 1st of this year, the fund's assets had fallen by 46% to $21 billion of investment and committed capital. Like many large hedge funds, D.E. Shaw is experiencing the fallout from subpar investment performance and asset-flight.

Deepwater Wind's CEO issued a statement saying that the layoffs won't affect his company's two wind projects

Deepwater Wind's CEO, William M. Moore, issued a statement saying that the layoffs won't affect his company's two wind projects – the eight-turbine demonstration project offshore Block Island and the larger wind farm destined to be located further off the island coast. Deepwater Wind recently established local offices in Rhode Island in anticipation of the wind projects moving forward. The company is also pursuing an offshore wind project in Atlantic waters off the Delaware coast.

The Rhode Island Supreme Court ruling means the path is clear for Massachusetts' Cape Wind project to move forward and become the first U.S. offshore wind project. That assumes it can clear legal hurdles it faces.

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