

MUSINGS FROM THE OIL PATCH

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

Offshore Wind Farms Face Tough Future

While most of the debate over the construction of offshore wind farms has been focused on political issues, the growing economic challenges facing these projects are starting to take their toll. While there have been public debates about the pros and cons of locating a wind farm off Cape Cod, two potentially large offshore wind farms were cancelled in recent weeks for economic reasons.

A proponent and opponent of the Cape Wind offshore wind farm debated the merits and demerits of this six-year old project that still has yet to be fully approved

Last month, a leading proponent of the Cape Wind offshore wind farm to be located in Nantucket Sound faced off against one of its leading opponents in a debate over the merits and demerits of this six-year old project that still has yet to be fully approved by all the regulatory agencies. As described by a reporter from the web site, www.capecodtoday.com, the debate, held under the watchful eye of a Rachel Carson photo, who is the subject of a centennial celebration at the Cape Cod Museum of Natural History in Brewster, Massachusetts, was between a hired gun (Charles Vinick) and a lightning rod (Jim Gordon). They squared off before a standing room only crowd in the museum's 125-seat auditorium, which had been fully reserved days before. The almost evenly divided audience listened to a nearly two-hour debate that was largely polite and almost lackluster, except for one brief exchange.

Mr. Vinick, described by the web site as the Darth Vader of environmentalists because of his weakness for dark ensembles, is the chief executive of the \$20 million funded, and growing, campaign called the Alliance to Protect Nantucket Sound that is a vociferous opponent of the Cape Wind project. Facing him was Mr. Gordon, the president of Cape Wind, which proposes to build the 130-turbine wind towers, which could provide upwards of 75% of Cape Cod's

Alliance is required by law to disclose its sources of money, but most of the major funders' names were "blacked out"

and the neighboring islands' electricity needs from a clean, renewable energy source.

The tart exchange came when Mr. Vinick claimed that Alliance revealed all its financial support, while Cape Wind, a private company, did not. As a non-profit organization, Alliance is required by law to disclose its sources of money, but as Mr. Gordon reminded the audience, most of the major funders' names were "blacked out" in the list Mr. Vinick made public. Mr. Gordon pointed out that the two top contributors were men in the oil business (one is William Koch owner of Koch Industries, an energy and coal producer) and asked, "why don't you put your money where your mouth is" and do something positive rather than spending \$20 million to stop the Cape Wind project? Mr. Gordon went on to state that all the funding for Cape Wind was from himself, his family and the top executives of his company.

The majority of the debate was spent rehashing the arguments that have been discussed for the past six-years of this project's life. Mr. Vinick claimed that the Cape Wind project posed a threat to national security because of its potential to disrupt radar signals, while the project was also termed a threat to the natural treasure that is Nantucket Sound, and "they'll kill endangered birds." All of these claims from the Alliance representative have been made numerous times in the past and all have been challenged, and in virtually every case proven to be unfounded, except for the debate over the aesthetics of wind turbines.

A recent poll of Massachusetts residents, including about 10% from the Cape and islands, showed that 93% agree that Massachusetts should be "a national leader in using cleaner and renewable energy"

On the positive side, Mr. Gordon pointed out that the renewable energy Cape Wind project could help jump-start America's effort to free the country from its dependence on foreign oil. He also questioned why not here and now, since the pressure and price impact on fossil fuels will only continue to rise in the future. Mr. Gordon's claims have been boosted by the results of a recent poll of Massachusetts residents, including about 10% from the Cape and islands. The poll, conducted by Opinion Research Corporation (ORC) for the Civil Society Institute (CSI), showed that more than nine in ten (93%) residents agree that Massachusetts should be "a national leader in using cleaner and renewable energy on a large scale by moving ahead with offshore wind power."

91% of Massachusetts residents see the potential of this initiative paralleling the Route 128 tech boom of the 1980s

The results of the poll supporting Massachusetts' renewable energy efforts showed amazing bipartisanship. Some 94% of Republicans, 93% of Democrats and 93% of un-enrolled voters all support this proposition. What was most striking, according to Graham Hueber of ORC, is that 91% of Massachusetts residents see the potential of this initiative paralleling the Route 128 tech boom of the 1980s and they want the state to emulate California in seeking to create jobs and industries by becoming a national hub for new energy technology development.

On the question of actual support for the Cape Wind project, 84% of those surveyed, including 58% from the Cape and islands, support

The survey results support the wind power initiative

it. The survey consisted of 607 respondents, of which 61, or 10% of the total, were from the Cape and islands. This sampling distribution closely tracks the percentage distribution of Massachusetts residents age 18 and older. Uniformly, the survey results support the wind power initiative and other actions designed to boost renewable energy consumption, lower fossil fuel emissions and boost automobile efficiency.

According to the survey results: 78% of residents and 61% on the Cape and islands support wind as the best source of electricity for the Cape and islands; 78% of residents favor a “five-year moratorium on new coal-fired power plants on the East Coast and the rest of the United States if there was stepped-up investment in clean, safe renewable energy;” 83% of residents agree that the federal automobile fuel-efficiency standard should be increased to 40 miles per gallon;” and 84% of residents believe that a significant portion of gasoline taxes should be used to accelerate research and development into alternative fuel and energy sources that would reduce America’s dependence on Middle East oil and lower global-warming pollution.

“visual seems to be the only issue that sort of sticks” from Cape Wind’s proponents, even after a laundry list of objections are presented

When the survey results were presented to the general public and the media, it was pointed out by a reporter that there was no question asked about the aesthetic impact of the wind farm. Mr. Hueber pointed out that one question asked, “People who oppose the project say it might be visually unappealing, could interfere with recreational sailing and other navigation and might endanger birds.” Those surveyed were then asked if they supported or opposed the project. The “opposed” number was 14% in total. After looking at the data, Mr. Hueber pointed out that the “visual seems to be the only issue that sort of sticks” from Cape Wind’s proponents, even after a laundry list of objections are presented.

An Alliance representative pointed out that in the past, residents of the towns of Mashpee and Nantucket had voted against the project by a two-thirds majority

These survey results support those of a similar CSI-sponsored survey in spring 2006 when 81% of residents and 61% of Cape and islands residents indicated they supported the Cape Wind project. In response to the survey, the Alliance to Protect Nantucket Sound responded that the small local sample size and a biased approach led to results that do not accurately reflect the views of Cape and islands residents. It pointed out that there were only 61 local residents in the survey and only a few of the legitimate objections to the project were presented to the respondents. An Alliance representative pointed out that in the past, residents of the towns of Mashpee and Nantucket had voted against the project by a two-thirds majority. In addition, the survey respondents were not told of the concerns of commercial fisherman, the cost of the project (over \$1 billion), objections from regional airports and ferry lines and the existence of alternative deepwater sites.

From our research of the objections of these groups, we believe most are a reflection of possible changes that would be inflicted on their current situation by the Cape Wind project. None of these issues, other than the cost, which has not yet been fully explored,

Within the past few weeks, two proposed U.S. offshore wind farm projects have been cancelled

have resulted in concerns that would shut down the project.

Aesthetics remain the prime objective of those opposing Cape Wind. To reinforce this position, the Alliance has started a \$25,000 television campaign against Cape Wind and also sponsored a half-page newspaper ad stating: "When a developer determines that the perfect place for a vacation is also the perfect place for a power plant, you have to question his research, as well as his travel agent." Not to be outdone, Greenpeace is launching a \$40,000, three-week television campaign in support of the project and targeting U.S. Rep. William Delahunt (D-Mass) and Sen. Edward Kennedy (D-Mass), both of who oppose Cape Wind.

What is most interesting about the Cape Wind debate and the renewable energy technology initiative of Massachusetts residents is that the opponents of offshore wind farms are largely finding traction with aesthetic, although economic objections are beginning to play a greater role. Within the past few weeks, two proposed U.S. offshore wind farm projects have been cancelled – one off the Atlantic Coast of Long Island and the other off Texas.

Exhibit 1. Vindeby Wind Farm Not Eyesore For Danes



Source: www.WindPower.org

The local residents became concerned that the project would mar the landscape of Long Island's south shore beaches

Off Long Island, a subsidiary of FPL Group Inc. (FPL-NYSE), FPL Energy, had proposed to construct a 40-turbine wind farm, which initially had the support of environmentalists. However, the project lost support as fears of escalating construction costs raised questions about the economic viability of the project, but moreover, the local residents became concerned that the project would mar the landscape of Long Island's south shore beaches. When the latest cost estimates showed that the project would cost \$700 million, FPL Energy notified the Long Island Power Authority that it was planning to scrap the wind farm plan. It is impossible to assign responsibility for the demise of the project, but one has to conclude that growing environmental challenges to the wind farm on the basis of aesthetics had to play a meaningful role in assessing future cost estimates if environmental challenges added to project delays.

As the preliminary cost estimate escalated well beyond \$1 billion, the feasibility of the project in Texas' low-cost electricity market fell into doubt

The project cancelled in Texas is slightly different. There, Babcock & Brown (BBNLF.PK-NASDAQ), an Australian-based energy and construction company, had acquired a lease off the coast of Kenedy County in South Texas about 60 miles south of Corpus Christi as part of its acquisition of Superior Renewable Energy of Houston. The wind farm project called for constructing 170 turbines over the 40,000 acre offshore site, but as the preliminary cost estimate escalated well beyond \$1 billion, the feasibility of the project in Texas' low-cost electricity market fell into doubt. Since the project was not well developed, i.e., engineering and costs estimates had not been completely developed, and the company was also pursuing a 157-turbine wind farm onshore in Kenedy County, the decision was made not to renew the offshore lease when its \$80,000 rental payment came due.

The average turbine costs per megawatt increased 17% in 2006 and projections call for a further 14% increase in 2007

A major issue for wind farm developers is the availability of turbines. Since GE Energy (GE-NYSE) bought Enron Wind from its bankrupt parent in 2002, it has increased its turbine manufacturing capacity fivefold, yet it remains sold out into 2009. GE Energy management has said that Congress needs to extend the wind farm developer tax credit due to expire at year-end, to provide them with the confidence to further expand capacity. The shortage of turbines has had a serious impact on project costs. According to the U.S. Department of Energy, the average turbine costs per megawatt increased 17% in 2006 and projections call for a further 14% increase this year. A typical 1.5 megawatt turbine (a popular size) cost a developer \$2.5 million this year, up from \$2.2 million last year. The cost estimate includes all turbine components and installation.

Against the backdrop of the Cape Wind debate and the recent wind farm cancellations for largely economic considerations, what does the future hold for U.S. offshore wind farms? At the present time there are no offshore wind farms in the United States, but the National Renewable Energy Laboratory projects that by 2030 about 12% of U.S. wind power generation will come from offshore. At the present time, there are about 12,000 megawatts (MW) of installed wind power generation capacity in the United States, or 1% of total U.S. electricity generation capacity.

In the U.K., the average interval between proposal and permitting of a new wind farm is some eight months

The most interesting aspect of the debate about offshore wind power and the economic challenges some of the planned projects are encountering is comparing the U.S. experience with that of Europe. Since Cape Wind was originally proposed in late 2001, there have been 13 wind farms completed in Northern Europe, with a further 11 now under construction or in the contracting stage.

In the U.K., the average interval between proposal and permitting of a new wind farm is some eight months, largely because the issues of site selection and environmental/wildlife protection have long been understood and settled. The scorecard of wind farm projects in Europe is impressive:

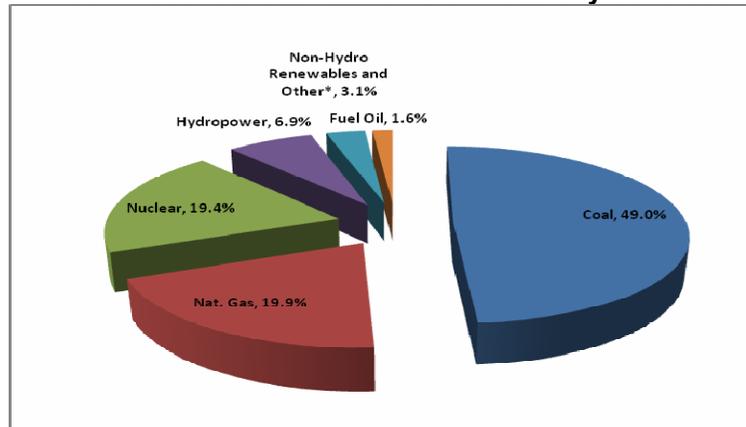
Today, with six offshore projects in operation, Denmark meets 18.5% of its total domestic power needs from wind

- British: 4, total capacity 300 MW, completed since 2001; 5, total capacity 388 MW, in construction; 2, total capacity 270 MW, to start construction this year.
- Irish: 1, total capacity 25 MW, completed since 2001.
- Swedish: 2, total capacity 20 MW, completed since 2001; 1, total capacity 110 MW, under construction.
- Dutch: 1, total capacity 108 MW, completed since 2001; 1, total capacity 120 MW, to start construction next year.
- Danish: 4, total capacity 389 MW, completed since 2001; 2, total capacity 400 MW, under construction.

The Danish story is quite compelling. In 1973, Denmark generated 90% of its electricity from imported oil. After the OPEC oil embargo, the country committed itself to wind energy, building turbines, first on land and then, from 1991, at sea. By 1997, the country had achieved total oil energy independence. Today, with six offshore projects in operation, Denmark meets 18.5% of its total domestic power needs from wind. That is the equivalent of powering the state of Rhode Island with all its generated electricity from wind alone.

Nantucket residents should note that the Danes erected 10 turbines off Samsø Island in 2003, making the island self-sufficient in electricity and carbon neutral. Samsø is the same size as Nantucket.

Exhibit 2. 2006 Fuel Sources for U.S. Electricity Generation



* includes – solar, wind, geothermal, biomass (agricultural waste, municipal solid waste, landfill gas recovery, wood, pitch), hydrogen batteries, chemicals, non-wood waste, purchased steam, sulfur and miscellaneous technologies.

Source: EIA, PPHB

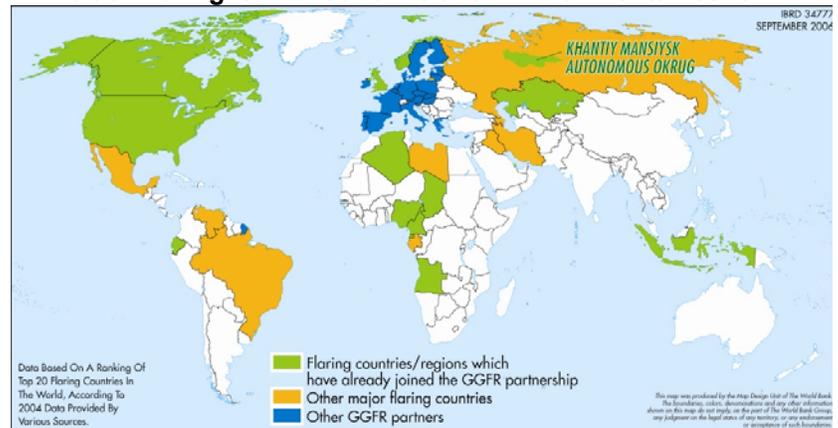
Despite the positive outlook for wind power in the United States, offshore wind farms look to face a challenging future. For all the positives expressed about the future of wind power, it barely registers on a chart of electric power fuel supplies. Economics of these offshore projects is only one of the challenges. Overcoming the aesthetic challenge may prove more difficult and not worth the cost, both in time and effort.

Global Study: Flaring Burns off Gas Worth \$40 Billion

World's petroleum industry is burning off natural gas worth roughly \$40 billion

A new study using satellite imaging shows that the world's petroleum industry is burning off natural gas worth roughly \$40 billion at 2006 U.S. gas prices, equivalent to 5.5% of the world's total natural gas production. The study was funded by a partnership to reduce gas flaring launched in 2002. The partnership brings together governments and international oil companies and is backed by the World Bank. The analysis for this new study was based on studying pictures taken by the Defense Meteorological Satellite Program, an arm of the U.S. Air Force.

Exhibit 3. Flaring Is An Economic and Environmental Issue



Source: Global Gas Flaring Partnership

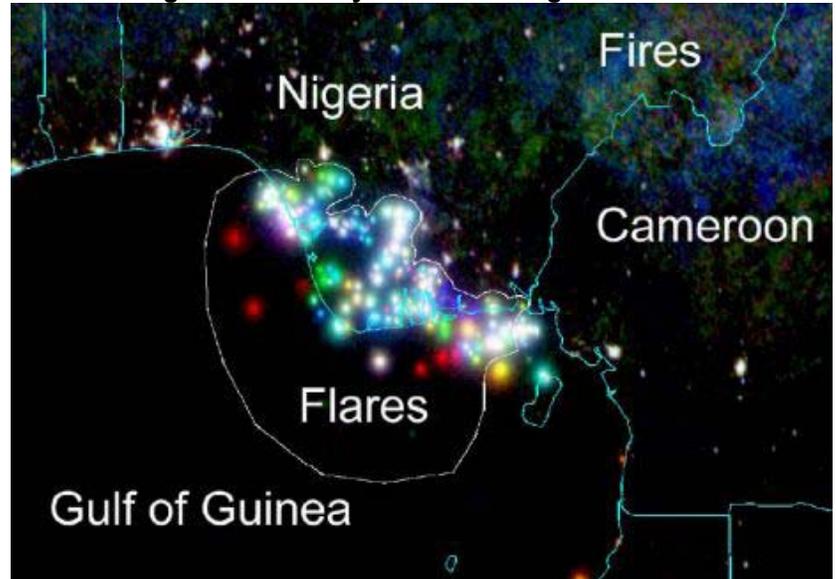
Exhibit 4. 2004 Gas Flaring From Space

Who Are the Top Gas Flarers?				
	OFFICIAL DATA for 2004		WHAT IMAGERY SHOWS for 2004	
	Country	Billion Cu. M.'s	Country	Billion Cu. M's
1	Nigeria	24.1	Russia	50.7
2	Russia	14.9	Nigeria	23.0
3	Iran	13.3	Iran	11.4
4	Iraq	8.6	Iraq	8.1
5	Angola	6.8	Kazakhstan	5.8
6	Venezuela	5.4	Algeria	5.5
7	Qatar	4.5	Angola	5.2
8	Algeria	4.3	Libya	4.2
9	Indonesia	3.7	Qatar	3.2
10	Eq. Guinea	3.6	Saudi Arabia	3.0
11	USA	2.8	China	2.9
12	Kuwait	2.7	Indonesia	2.9
13	Kazakhstan	2.7	Kuwait	2.6
14	Libya	2.5	Gabon	2.5
15	Azerbaijan	2.5	Oman	2.5
16	Mexico	1.5	North Sea	2.4
17	U.K.	1.6	Venezuela	2.1
18	Brazil	1.5	Uzbekistan	2.1
19	Gabon	1.4	Malaysia	1.7
20	Congo	1.2	Egypt	1.7

Source: Global Gas Flaring Partnership, NOAA

According to the study, the total volume of natural gas flared has remained steady at about 150 billion to 170 billion cubic meters since the mid 1990s. That volume is the equivalent of the combined natural gas consumption of the U.K. and Italy. One surprising figure emerged from the study. Officially reported figures show Nigeria as having the highest level of flaring, but the satellite pictures suggest that Russia is flaring much more gas than it has admitted and actually exceeds Nigeria in the volume flared.

Exhibit 5. Nigeria Has Always Been Leading Gas Flarer



Source: Global Gas Flaring Partnership, NOAA

The figures show that Nigeria has reduced its flaring the most of any country, having cut its volume by 10 billion cubic meters over the 12-year period

Nigeria has been aggressively working to reduce its gas flaring, not only due to global environmental pressures, but also from economic concerns. The country has aggressively engaged the international petroleum industry to develop liquefied natural gas (LNG) facilities to move the gas the long distances from the non-existent African market to European, Asian and North American markets where gas is coveted both to help meet growing energy demand and for its cleaner burning properties. The figures show that Nigeria has reduced its flaring the most of any country, having cut its volume by 10 billion cubic meters over the 12-year period. Other regions and countries that have cut their flaring include the Gulf of Mexico, Algeria, the North Sea and Indonesia. Areas and countries that increased their flaring, besides Russia, include Saudi Arabia, China and Kazakhstan.

As we read this report, we were struck by two considerations. First was the sheer magnitude of natural gas that is burned (wasted) every day globally, especially in a world that is worried about the impact on the climate from hydrocarbon consumption. Second is to recognize the role this wasted gas supply could play in easing the world's energy supply/demand balance – not just now, but also for the future. Lastly, we thought about how much natural gas and

Exhibit 6. Russia Flaring More Gas Than Admitting

Source: Global Gas Flaring Partnership, NOAA

crude oil has been lost to flaring, well blowouts and reservoir mismanagement over the past century and a half of the petroleum age. Had we been able to better manage our petroleum resources over these years, would we still be as concerned about Peak Oil with all its attendant economic, political and social disruptions? Of course, thinking about the 'what if' reminds us of the rhyme: Were ifs and buts, candy and nuts, what a wonderful world we would live in.

China: The Great Leap Backwards?

The issue is not as much a question about economics and technology, but more about the country's dedication to making the structural modifications that threaten the authority of the Communist Party

We recently read an article by Elizabeth C. Economy, the C.V. Starr Senior Fellow and Director for Asia Studies at the Council on Foreign Relations in the current issue of *Foreign Affairs*. The article, entitled [The Great Leap Backward? The Costs of China's Environmental Crisis](#), also was referenced by an investment newsletter we read. The article discusses the environmental situation in China and its implications for the continuation of the country's economic miracle along with the challenges for changing the current trends. The conclusion is that the issue is not as much a question about economics and technology, but more about the country's dedication to making the structural modifications that threaten the authority of the Communist Party. Ms. Economy believes that since China's leaders have shown themselves capable of bold reform in the past, there is every reason to believe they may still have that ability.

When we look at the litany of pollution and environmental woes of China, we understand the risks to its economy, public health, social stability and international reputation. The risk was best summed up by Pan Yue, a vice minister of China's State Environmental Protection Administration, who said, "The [economic] miracle will end soon because the environment can no longer keep pace."

The costs to the Chinese economy are listed below

In an article entitled *The Breath of the Red Dragon* by Christopher Hancock, the costs to the Chinese economy of pollution and environmental waste were listed, which we have reproduced below.

He drew on Ms. Economy's research, that of James Kynge, former China Bureau Chief for the *Financial Times* and his own experience.

The Costs...

Air

- The percentage of China's energy needs supplied by coal: 70
- China must construct a new coal-fired power plant every week just to keep pace with demand.
- The average life expectancy of a Chinese city traffic police officer: 43 years
- The chief culprit for his abridged life: air pollution
- The number of reported premature deaths in China caused by respiratory diseases related to air pollution on an annual basis: 400,000
- The actual number: 750,000 (According to the World Bank... Beijing didn't want to release the actual figure due to fears of inciting social unrest.)
- The combined number of individuals who died at Hiroshima and Nagasaki as a result of atomic bomb related causes: 410,000
- The number of pollution related protests that took place in communist China in 2005: 51,000
- The number of doctors your editor visited for an unidentified lung ailment he developed after living in Hong Kong for less than two years: 3
- Total amount spent to cure his "cough": \$1,000-plus
- The number of people China will re-locate to newly developed urban centers between 2000 and 2030: 400 million
- The population of the United States: 302,730,255
- The number of the world's 20 most polluted cities that call China home: 16
- The year China will emit twice as much carbon dioxide as all of the OECD countries combined: 2032
- The number of new nuclear reactors needed to be built each month from now until 2070 to make any difference to global carbon emissions: 4
- The most optimistic forecast regarding the time it takes to build one nuclear reactor: 36 months

Land

- The percentage of China's landmass that remains uninhabited: 50
- The percentage of humanity crowded onto just 7% of the world's cultivatable land: 20
- The distance China's Gobi Desert continues spreading annually: 1,900 square miles

- The percentage of the entire country that is now desert: 25
- The percentage of China's agricultural land that receives ample amounts of acid rain: 33
- The amount of annual Chinese grain production contaminated with heavy metals: 12 million tons
- The number of Chinese citizens who died as a result of the famine that immediately followed Mao's Great Leap Forward: 30 million
- The total number of Chinese who died as a result of Mao's policies: 80 million (Chen Yizi: July 17, 1994, *Washington Post* ("Great Leap Forward, 1959-61"))
- The total number of deaths attributed to both World Wars: 70 million
- The number of tropical logs shipped worldwide that the International Tropical Timber Organization estimates are bound for China: 1 in 2
- The total area of rainforests, the "lungs of the planet," destroyed each year: 24,000–30,000 square miles
- The total area of West Virginia: 24,231 square miles

Water

- The ratio of China's 660 cities that have less water than they need: 2 in 3
- The number of years before cities in the Northeast China could completely run out of water: 5-7
- The amount Beijing commissioned to divert river water to address the problem: \$60 billion
- This represents the largest civil engineering project since the Great Wall.
- The percentage of China's city aquifers deemed polluted: 90
- The Yangtze River received 40% of the country's sewage, 80% of it untreated.
- The number of Chinese who drink water contaminated with animal or human waste: 700 million
- The number of doctors your editor visited after drinking one glass of Hong Kong tap water: 2
- The number of days that the single glass of water confined him to his bed: 10
- The ratio of fish species native to the Yellow River now extinct thanks to pollution: 1 in 3
- The percentage of the East China Sea, one of the world's largest fisheries, now rated unsuitable for fishing: 80-plus
- The percentage rated unsuitable for fishing as of 2000: 53
- The largest exporter of fish to the United States: China
- Melting glaciers in Tibet threaten to flood both the Yangtze and Yellow Rivers.
- The year scientists now warn rising sea levels could submerge Shanghai: 2050

The Affects Here at Home

- The number of Chinese made toys Mattel decided to recall: roughly 1 million
- Thus far, the number of deaths directly attributed to this incident: 1 (Zhang Shuhong, owner of Lee Der Industrial, a company that made toys for Mattel, hanged himself in a company warehouse shortly thereafter.)
- The U.S. Environmental Protection Agency estimates that on some days, 25% of the particulates in the Los Angeles atmosphere originated in China.
- The U.S. Environmental Protection Agency recently reported that one-third of the nation's lakes and nearly one-quarter of its rivers are now so polluted with mercury that children and pregnant women are advised to limit or avoid eating fish caught there.
- Scientists estimate that roughly one-third of that mercury settling in the United States comes from other countries, China in particular.
- China spews around 600 tons of mercury into the air each year.

Studies both inside and outside China estimate that environmental degradation and pollution cost the Chinese economy between 8% and 12% of its GDP annually

After reading these lists of environmental problems created by the actions of the Chinese government and its economic policies, one is left wondering how the country can handle its burgeoning population growth while sustaining its extraordinary economic growth rate. According to Ms. Economy, studies both inside and outside China estimate that environmental degradation and pollution cost the Chinese economy between 8% and 12% of its Gross Domestic Production annually. This is a huge economic penalty, but one that can only be cured by structural and attitudinal changes.

Beijing's message to local officials continues to be that economic growth cannot be sacrificed to environmental protection; rather the two objectives must go hand in hand

Ms. Economy documents the fact that local officials, who are most responsible for enforcement of the policies of Beijing on economic and environmental issues, tend to ignore the environmental mandates, preferring to concentrate their energies and resources on further advancing economic growth. Economic growth generates jobs, which eases social and political pressures, plus it generates tax revenues. Beijing's message to local officials continues to be that economic growth cannot be sacrificed to environmental protection; rather the two objectives must go hand in hand. However, since new environmental actions often come with serious economic up-front costs, local officials tend to pursue their short-term economic interests first and for the most part ignore Beijing's directives to change their ways.

Chinese officials are becoming more concerned about the impact of local climate change issues and the country's growing population. The head of the State Meteorological Administration says that global warming could cause China's grain harvest to fall by 5% to 10% by 2030, just as the country's population will reach a peak of 1.5 billion people, up from 1.3 billion today. To feed that population, the

Warmer weather will shorten the growing period of some crops, plus higher temperatures will increase evaporation making it harder to irrigate plants

country needs an extra 10 million hectares of arable land, or about 8% of that currently under cultivation. Unfortunately, warmer weather will shorten the growing period of some crops, plus higher temperatures will increase evaporation making it harder to irrigate plants. Crop-damaging insects will find it easier to survive winters and become active earlier in the spring, requiring more pest control that could make farming more expensive.

Making the needed structural political changes will risk the authority of the Communist Party

Effective environmental protection requires transparent information, official accountability and an independent legal system. However, these features are the building blocks of a political system fundamentally different from that of today's China. Making those changes will risk the authority of the Communist Party. As Ms. Economy states: "Until the party is willing to open the door to such reform, it will not have the wherewithal to meet its ambitious environmental targets and lead a growing economy with manageable environmental problems."

As the publicity about the environmental challenges – air and water quality – at the upcoming Olympics next year grows and highlights China's inability to meet these commitments, this showcase event for the country may produce more problems than pluses. If the nations of the world who assemble in Beijing question the environmental policies of China, and social disruptions within the country grow, questions of whether the economic miracle that has been the Chinese economy may be snuffed out will increase. That would be a scenario with many and varied far-ranging implications. What happens to China's energy production, its energy consumption, its materials needs, its ability to create jobs for its growing population, its purchase of U.S. debt, and on and on – all with significant implications for the global economy.

Canadian Oil Sands Profitability Challenges

The cost increase represents a 10%-15% hike over the previous C\$5.3 billion estimate

Last Friday, the partners behind the Long Lake oil sands venture, OPTI Canada Inc. (OPC-TSX) and Nexen Inc. (NXY-TSX), announced a revised cost estimate and a further delay in the project's startup. Long Lake is now estimated to cost between C\$5.83 billion and C\$6.1 billion, as labor shortages have contributed to pushing the project's startup into 2008.

The cost increase represents a 10%-15% hike over the previous C\$5.3 billion estimate, which had itself been raised by C\$400 million merely four months ago. The short time between revised cost estimates and the magnitude of the hike was a surprise to analysts and investors. According to OPTI, the project's cost and delay issues are the result of difficulties in finding sufficient labor, especially pipefitters, which has slowed construction of the oil sands upgrader for converting the tar-like bitumen into light, sweet synthetic crude oil. The labor shortage has pushed the project's startup into the first half of 2008, with production of the first synthetic crude oil late in the second quarter. Long Lake partners had

With this new cost estimate the economics of the oil sands business are starting to be questioned

originally targeted the first oil production by the end of 2007. The first phase of the project's production should reach peak production of 60,000 barrels per day in 12-18 months after the upgrader comes on stream, or by 2010.

With this new cost estimate, following on a series of cost increases for other oil sands projects and delays in their startups, the economics of the business are starting to be questioned. This is an important issue as the ramp up in oil sands output (up to 1 million barrels per day, currently) is sending more of it south of the border and reducing the United States' Middle East oil dependency ratio. In anticipation of the under-construction oil sands projects coming on stream over the next few years, the Canadian and U.S. oil pipeline network is being reworked to bring more of this synthetic crude oil into the U.S. and then moving more of it to the Gulf Coast where the bulk of this nation's refining capacity is located.

The recent oil sands project cost increases highlight a concept, raised by Roel Mayer, a freelance writer on earth, energy and economy living in Canada, called "the law of receding horizons." The law says that as the cost of energy rises, the cost of everything else made with energy, such as building materials and equipment, also rises. Thus, an energy project that was expected to be profitable when energy prices were X amount higher than today, turns out to still be uneconomical when you get to that target price. The question is whether the oil sands of Alberta may become the law-of-receding-horizons poster child.

About C\$117 billion is going to be spent on oil sands projects by 2015

According to a report by energy research firm Wood Mackenzie about C\$117 billion is going to be spent on oil sands projects by 2015. They also pointed out that costs for a peak flowing barrel of oil derived from oil sands have increased by 55% since 2005. In 2006 alone, project cost estimates, as announced by operators, rose on average by 32% for integrated mining projects and increased by 26% for in situ projects. For example, last year, Shell Canada (RDS.B-NYSE) shook up the investment community when it announced that its Athabasca tar sands operation would cost C\$11 billion to expand its operation by 100,000 barrels per day, some six-times the original estimate, which had been made eight years earlier.

The labor situation is likely to only get worse when, and if, Canada moves forward with its planned Mackenzie Valley gas pipeline project

While labor shortages are the most visible and challenging problems for oil sands developers, the projects are also confronting rising costs for steel, tires, machines and basic metals. The labor situation is likely to only get worse when, and if, Canada moves forward with its planned Mackenzie Valley gas pipeline project, something that is critical for the long term energy needs of oil sands projects. Curing the Canadian labor supply problem by allowing greater numbers of immigrants into the country is only a stopgap solution. The ultimate solution would be for a slowdown in upstream oilfield activity – which creates a Catch-22 situation.

The costs associated with oil sands projects are rising, and appear

Costs are climbing for labor, materials and energy. Eventually, we may be adding taxes and pollution-related costs to this list

to be rising at a faster rate each year. Costs are climbing for labor, materials and energy. Eventually, we may be adding taxes and pollution-related costs to this list. The economics of oil sands projects, coupled with shortages of equipment, are taking a toll on the pace of oil sands project developments. In the past 12 months, Canadian Natural Resources, Ltd. (CNQ-TSX) said it won't move forward with an upgrader unit due to runaway costs. Total SA (TOT-NYSE) announced that it was pushing its oil sands project back by three years due to soaring costs for labor and materials. Lastly, Synenco Energy Inc. (SYN-TSX) shelved its upgrader plans for economic considerations.

Exhibit 7. Canada Oil Sands Deposits Are Huge



Source: NEB

The changing tax environment may ultimately prove to be a bigger problem for future oil sands projects

While these costs raise serious concerns, the changing tax environment may ultimately prove to be a bigger problem for future oil sands projects. Last October, the Canadian government announced plans to remove the tax advantage for income trusts, which have been among the largest backers of oil sands projects. Another change was the removal of the accelerated capital cost allowance, which will boost the government's revenues at the expense of companies. But the greatest threat is a change to Canadian royalty rates for oil sands.

Under the existing Alberta royal scheme, it offers a 1% royalty rate for oil sands projects until the initial costs of the projects are paid off, at which time the rate reverts to 25%. Given this royalty rate

On oil sands revenues of about C\$15 billion, Alberta received only about C\$700 million in royalties, or less revenue than it received from lotteries

structure, projects are being developed by operators who extend their "initial" investment by phases over a period of years, enabling them to benefit from the 1% royalty rate for an extended period of time.

The 1% royalty rate equates to about C\$0.50 for every barrel of C\$70 oil for the province's coffers. According to 2004 figures, the province of Alberta, on oil sands revenues of about C\$15 billion, received only about C\$700 million in royalties, or less revenue than it received from lotteries. While the oilfield boom in Alberta is bringing increased tax revenues to the province, it is also straining its infrastructure and the social needs of the region. If royalty rates were to be changed from 1% to closer to the 40% level for oil, the oil sands industry would not be profitable. Can North America allow the oil sands not to be developed, or will politics work to overcome rising labor, construction and capital costs?

Will Global Warming Trip Up Nuclear Power?

On August 16, the Tennessee Valley Authority (TVA) had to shut down one of its three units at the Browns Ferry nuclear power plant because the water from the Tennessee River used to cool the plant was too hot. The water temperature exceeded 90° F for an average of 24 hours, the threshold level. The two remaining units were operated at reduced power levels to help ease the cooling water situation. This summer's heat wave in Europe is resurrecting the issue of the impact of global warming on the future of nuclear energy.

Politicians and scientists have called nuclear power the silver bullet of global climate change

Politicians and scientists have called nuclear power the silver bullet of global climate change because it generates electric power at a low cost and without emitting greenhouse gases, the cause of increased global warming. However, as Europe, and in particular France, has experienced in recent years, the summer heat restricts the operation of nuclear power plants just at a time when power demand surges with the increased use of air conditioning.

The operation of nuclear power plants is dependent on cool water to operate at safe temperatures

France has long been proud of the fact it generates 80% of its electricity from nuclear power plants. Not only does this help the country in its greenhouse gas emissions goals, but it relieves France of dependency on the increasingly precarious supply of fossil fuels. The operation of nuclear power plants is dependent on cool water to operate at safe temperatures. That water is then pumped out at a higher temperature, warming the body of water from which it came. Regulations in France mandate that temperatures within the power plant not rise above 50° C (122° F), and the released water cannot exceed 25° C (77° F). The problem is that three-quarters of French nuclear power plants, along with many others around the world, are situated next to rivers or lakes and the supply of cool water can dry up during heat waves. This forces the power plants to have to reduce their output or shut down. This is a serious problem as the hot weather also reduces the output of hydroelectric power plants, France's second leading energy source.

Exhibit 8. Nuclear Power Promoted As Silver Bullet For Energy

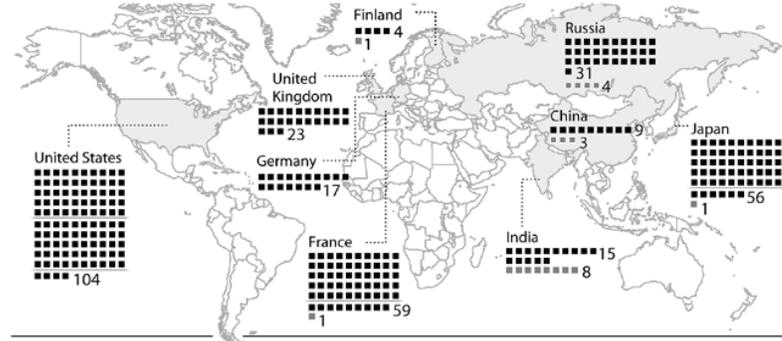
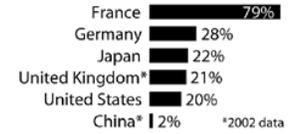
NUCLEAR POWER RESURGENCE

Weaning dependency on foreign fuel

France is the most nuclear energy-dependent country in the world with 59 reactors churning out nearly 80 percent of its electricity.

Select countries with nuclear plants
 ■ Reactors ■ Under construction

Percentage of electricity supplied from nuclear energy, 2003



Source: IEA, *The New York Times*

Last summer, EDF was forced to reduce power or shut down 17 of its 58 nuclear power plants due to the heat wave that swept Europe and its impact on water temperatures

Electricité de France (EDF), the operator of the country's nuclear power plants, draws up to 670 billion cubic feet of water for them from rivers and lakes – about half of all the freshwater drawn from the environment and far more than used by the French agriculture industry. Last summer, EDF was forced to reduce power or shut down 17 of its 58 nuclear power plants due to the heat wave that swept Europe and its impact on water temperatures. France was not the only European country to suffer power problems from that heat; plants in Spain, Germany and Sweden all experienced cooling water problems.

Exhibit 9. Nuclear Electricity in Europe

	Country	Pct.
1	France	78
2	Lithuania	72
3	Sweden	52
4	Ukraine	51
5	Bulgaria	42
6	Germany	32
	Czech	
7	Republic	31
8	Finland	27
9	Spain	23
10	Britain	20

Source: BBC, 2006

Last month scientists associated with the UN's Intergovernmental Panel on Climate Change warned Europe in a report to expect severe water shortages in the decades ahead as glaciers dry up,

A solution might be to locate future new nuclear power plants on the coasts of countries, or at least on very large bodies of water

snowfalls decrease and temperatures rise. A solution might be to locate future new nuclear power plants on the coasts of countries, or at least on very large bodies of water, such as in Canada where all the plants are positioned on the Great Lakes or the Atlantic Ocean. Of course, with 40% of the U.S. population living near the coast, siting new power plants adjacent to these population centers will prove extremely difficult. This challenge highlights the difficulty of balancing our environmental demands and our energy needs when the solution may not be politically popular.

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