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Opening Remarks

Thank you for coming today; I have been attending NOMADS events for the past eight years. Your group brings a unique international view to the industry that spent the last 25 years struggling financially through the downturn and losing many people along the way, but today you are the rising stars of Wall Street.

The analysis I am presenting today indicates that the future is bright for this group as I see only increased demand for the products and services developed by the people and companies that participate in NOMADS and the energy industry.

I have heard a lot of stories about what happened to the US economy in the '70's during the oil embargo, the potential changes due to World Peak Oil could be order of magnitudes greater than the '70's and dramatically change the way we conduct our lives and think about energy.

At the end of this presentation I look forward to your questions and comments. The critical eye you have for the interpretation of data and trends will either reinforce what I think is happening or allow me to rethink some of my conclusions.

Please be objective; I am more interested to hear why I am wrong than if you agree. In other words, if I am missing something... please, tell me now.

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Agenda

1. What is Peak Oil?
2. My Conclusions
3. How I Came to the Conclusions
4. Production Issues
5. Implications of Peak Oil
6. What to do?

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Peak Oil...Not a Difficult Concept

Peak Oil is the point in time when the maximum rate of global petroleum production is reached, after which the rate of production enters its natural irreversible decline. To be clear, it is not the end of oil, but the end of cheap oil. If global consumption is not reduced or alternatives are not discovered between 10 and 20 years before the peak, an energy crisis may develop and all energy prices will rise, perhaps dramatically.

World crude oil demand typically grows at 1.7% per year, has grown at around 2% per year driven in recent years by China and India who desire higher living standards. As these huge energy consumers enter the market, they compete for the same dwindling supply and drive up the price of energy. China has seen oil consumption grow by 8% per year since 2002.

To put China and India's consumption of energy into perspective, if they double their standard of living, they will be 1/10th of the US.

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The Conclusion – We Are in the Peak Oil Era

1. Peak Oil is currently occurring or will occur by 2015. Each month new data regarding production will provide valuable information, but it appears that the past 18 months of production has been flat. It is unclear how long this will continue as increases in price have done little to increase production.
2. The energy industry has entered a period of long-term growth driven by years of underinvestment, overproduction and overall mis-understanding of the value of energy.
3. Without a catalyst for dramatic price increases (nationalism, supply disruption, etc) prices will gradually increase based on speculation until we get accurate numbers on production and consumption.
4. The rising price of oil will finally provide the umbrella for coal, natural gas and alternative energy to grow.
5. Significant changes will occur in our way of life as we adjust to a world dominated by more expensive energy.

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Steve Crower 18 Years of Experience

Background

Let me explain how I reached my conclusions that I will present to you today. Over the past 10 years I felt as though I have been drinking from a fire hydrant as I have been fortunate to have worked in the upstream, midstream and downstream aspects of the energy industry. During that time I have developed an appreciation for the creation of a BTU of energy that allowed me to shape my current view on where the industry is going. In addition to production models and supply/demand curves, it is my applied work experience in the energy industry that provided me insight into what we now call "Peak Oil".

After graduating as a Civil Engineer from the University of Michigan, I spent four years working in the design and construction of refineries and other large construction projects. Prior to attending Rice University's MBA program I swore that I would never work in a boom/bust industry with a less than flattering reputation.

Economics won over principle as I accepted a position in 1996 as a Financial Analyst with FMC Technologies (NYSE:FTI). I was the MBA finance guy who worked hand-in-hand with seasoned professionals to make pumps, valves, subsea and surface trees and wellheads, loading arms, pressure control equipment equipment for the largest E&P companies on the planet. Although based in Houston, FMC allowed me to travel to Scotland, Norway, Singapore, New Foundland and Brazil to see different energy markets.

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I enjoyed my time at FMC, but with oil prices below \$20 per barrel, gasoline selling for \$.90 and Exxon combining with Mobil to survive, I saw no end in sight and politely bowed out of the industry. I could not believe how unappreciated the science of producing a barrel of oil was by the general population.

In 2000, I followed the herd and went to work at, Network International a technology start-up in Houston. After raising \$54 million, we blew through \$34 million and settled on "eBay for the oilfield"; creating an on-line marketplace that allows energy companies to buy and sell used oilfield equipment. At Network, I traveled to most domestic oilfields to conduct auctions of drilling contractors at depressed asset values because they were no longer able to survive in an environment of cheap oil.

In 2003, I joined Capital One Southcoast in New Orleans as an Energy Investment Banker. I was fortunate to be able to work on dozens of public equity offerings in Seismic, Exploration, Drilling, Production, Shipping, Storage, and Distribution. I personally managed the sale of three refineries and three oilfield service companies each selling for what I thought was a bargain. Based on the continued upward direction of today's environment...they were bargains. Each transaction provided me with insight into another production basin, use of equipment, or process improvement associated with the energy industry.

It was during this time I was introduced to the concept of "Peak Oil".

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May 2005 Peak Oil Scenario

In May of 2005 I was in Houston attending the "Offshore Technology Conference". On the first day of the conference I attended a lunch presentation by Matt Simmons entitled "The Big Surprise for 2005". At the time, I had known Matt for several years as he recruited at Rice, was FMC's investment banker, Southcoast co-managed several public equity deals with his firm, Simmons International, and I had met him socially several times at industry functions. I admired his honest opinions and the depth of his knowledge of all things energy. Matt's critics consider him an "eternal energy bull", only looking out for his own best interest - his investment bank and the industry to which he provided investment banking services.

I heard him speak several times in the past, but during this particular speech Matt was remarkably different appearing stern, even agitated. He began his speech by discussing his extensive research of 1,000's of SPE technical white papers that had been recently put on-line for ease in public analysis. He combined that new source of technical data with his three decades of experience and his investment banking team's research capability to prepare a production model to serve as the basis for his book "Twilight in the Desert - The Coming Saudi Oil Shock and the World Economy".

Matt laid out the following scenario:

1. Nearly 25% of the worlds production is generated from the 20 largest fields discovered decades ago. Since the world has "globalized" it is safe to say that oil companies have already found the "easy oil". In the 60's the world discovered 8 "big" fields that produced between 500,000 to 1,000,000 bpd. In the 70's and 80's

only two were found. In the last 18 years only one field that is capable of producing in excess of 500,000 bpd has been found in Kazakhstan. Two decades ago about a dozen fields produced more than a million bpd now there are only four. Saudi Arabia's Ghawar field, by far the biggest in the world, could begin a gradual decline within a decade.

2. Without massive investments in energy infrastructure (storage, pipelines, rigs, rail) our existing infrastructure will be incapable of handling our demand for petroleum products.
3. Similar to what happened in the United States in 1970, world oil production would hit peak production capacity of 85 million barrels-per-day in 2005.
4. The reduction in the supply of crude oil imported to the United State will generate a tremendous price spike in oil, perhaps in excess of \$100 per barrel (Goldman Sachs).
5. The financial ramifications of this for the United States would be severe.
 - a. Suburban living, once the ideal way to "have it all" would be less attractive as people turn to high density less transportation focused living in urban areas.
 - b. Rail will eclipse trucking as the primary transportation,
 - c. Transporting a salad 3,000 miles would end because the cost to transport the good will be multiples of the cost of the good.
6. Conservation was the only short-term solution as the development of alternatives is a long way off in the future.
7. Finally, he stated "I hope I am wrong, but I don't think I am".

After the presentation, a stunned audience walked back into the conference. My Managing Director at the time dismissed the presentation as another "typical Matt Simmons eternal bull speech". Since I personally knew Matt, I had a difficulty believing he would put his hard earned reputation on the line by writing a book, making a presentation to 400 industry executives just to sell a few books and generate a few more investment banking transactions. Matt made it clear that he has no political

agenda and does not need the money; rather, similar to what M. King Hubbert felt in 1956 when he first presented what is now known as "Hubbert Peak Theory" that accurately predicted that United States oil production would peak between 1965 and 1970, Matt thought it was his responsibility to let people know what has occurred, based on his interpretation of the information.

Concepts of Peak Oil Show Up in Life

Maybe by chance, but during the remainder of 2005 several things occurred which made me believe what Matt said at OTC was true.

First, I read his book which performed an in-depth analysis of each Saudi oilfield and exposed the disconnect between what the production engineers would state in SPE papers and Saudi leadership's assurances that the Middle East had plenty of oil supply to meet the World's growing demand. For example, he found SPE technical papers written by production engineers who were eager to share their technical knowledge with other members of SPE of how they were able to avert the intrusion of water into a wellbore. Water intrusion is a phenomenon found in aging fields on the decline, not fields with adequate pressure, typical of wells early in their production cycle. By analyzing the SPE papers, Matt was able to counteract the promises of the Princes making assurances to the public of eternal reserves that continued to grow even as their production grew. Matt rationalized that either the Princes were unaware of the production issues or were not willing to admit that their power to affect global politics may diminish, as they would not be viewed as the stabilizing force in the Middle East.

Second, I lived in New Orleans at the time and evacuated the day before Katrina wiped out 15% of the already strained US refining capacity. I watched market forces increase the price of gasoline from \$1.50/gallon to \$3.00/gallon in the following days to counteract the

lack of supply. How could a 15% decline in supply result in 100% increase in price? This small supply "shock" reinforced to me how little redundancy there is in our energy supply chain.

Third, during my evacuation during Katrina I continued to work on the sale of a well-service company owned by Petro-Canada based in Colorado's DJ basin. I spent days in the field with the rigs as we hosted buyers for the sale of the well service company. I observed dedicated workers, literally risk their lives (definitely fingers and arms) to extract oil from a tired field that would be transported to a collection area, sent to a refinery, trucked to a service station only to have a Soccer Mom put the precious refined commodity in an SUV to take her kids to school.

By the end of 2005 I realized how difficult it is to produce a barrel of oil, the industry was basically giving away its precious product in the form of inexpensive finished goods.

Even today, I do not know the right price for a barrel of oil, but I was convinced that \$50 even \$100 was too low.

We were about to see dramatic increases in prices and everything associated with the production and consumption of energy.

Matt Simmons was right and if no one got the message then, they will get it soon.

Why is Matt right? Let's take a look at how his predictions fared three years in the future.

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Peak Oil Predictions - Three Years Later

1. In September 2006, The "Jack 2" deep-water test well in the Gulf of Mexico was announced as evidence that there is no imminent peak in global oil production. According to one estimate, the field could account for up to 11% of US production within seven years. However, The Jack 2 field is more than 20,000 feet under the sea floor under 7,000 feet of water, requiring 8.5 kilometers of pipe to reach. Additionally, even the maximum estimate of 15 billion barrels represents slightly less than 2 years of U.S. consumption at present levels.
2. We began investing in energy infrastructure (storage, pipelines, rigs, rail). Prices to store and transport crude is at an all time highs, all cold-stacked rigs are being put to work and finally being compensated according to the high-risk operations they perform. Design Engineering firms have a three year backlog of projects, but personel contstraints are limiting the capacity.
3. Arguably, the financial ramifications for the United States have been moderate but livable. The sub-prime mess has probably been exacerbated by high-energy prices but, with a few more regulations, the financial industry appears to be in good condition. I think the market undervaluing companies as it is still looking back on the earnings and has yet to factor in the earnings growth in an industry that become extremely efficient over the past 25 years just to survive. Price becomes less of an issue to a company scrambling to keep production flat.
4. Energy inefficient suburban homes are decreasing in value with plenty of sellers but few buyers.

5. Rail is enjoying a renaissance and may soon eclipse trucking as the primary transportation. The Dow Jones Railroads Index has well over doubled in valuation in three years.
6. Prices of agricultural products (i.e. cesear salads) are increasing due the increasing feedstock costs and the opportunity to use crops for alternative sources of energy.
7. Moderate conservation is taking place as gasoline demand is finally showing signs of flattening.
8. I have seen more early stage companies seek financing and we are beginning to develop alternative and renewable energy sources.

I think Matt was right, but unless we have a catalyst to shock they system (supply disruption) the transition may not have to be as violent as he predicts.

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Oil Production May have Flattened Out

World oil production in 2005 was 84.48 mbb/d, in 2006 was 85.24 mbb/d (a 1% increase), in Q3 2007 was 85.08 mbb/d (a 1% decrease); flat production in an environment when oil increased from \$50/bbl to \$75/bbl. From 1987 to 2005 (oil prices ranged from \$15/bbl to \$50/bbl) production increased 1.2 mbb/d (1.7%).

Time Frame	Production	Price Range of Oil	Year-Over-Year
1987-2005	Increased about 1.2 mbb/d each year	\$16-40/bbl	1.7% increase
2005 Average	84.48 mbb/d	\$54/bbl	
2006 Average	85.17 mbb/d	\$61/bbl.	0.81% increase
2007 Average	85.15 mbb/d	\$65/bbl.	Flat

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Declining Production On Existing Fields

Of the largest 21 fields in the world, about 9 are already in decline and some are beginning to accelerate.

Mexico - Mexico's Cantarell field that produces one out of every 50 barrels of oil in the world is fading so fast that that Mexico who is currently an exporter of oil to the US may become an importer in less than 8 years. Leaving the US even more dependent on Middle East imports. In fact, from January 2006 to February 2007, Cantarell lost a staggering one-fifth of its production with daily output falling to 1.6 million bpd from two million bpd. PEMEX believes they can cut the 400,000 bpd shortfall in half with a \$2.4 Billion CAPEX budget this year and expect the field to decline at a rate of 10% per year down to a daily of average of 600,000 bpd in 2013.

Kuwait - Kuwait's Burgan field is showing signs of maturity. In November of 2005 Kuwait Oil Co lowered the production estimate to 1.7 million bdp from 1.9 million bpd.

Alaska - Prudhoe Bay has dropped from 2 million bpd in 1988 to its current rate of 900,000 bpd.

Saudi Arabia - In April 2006, a Saudi Aramco spokesman admitted that its mature fields are now declining at a rate of 8% per year, and its composite decline rate of producing fields is about 2%. This information has been used to argue that Ghawar, the largest oil field in the world and a field responsible for approximately half of Saudi Arabia's oil production over the last 50 years, has peaked. King Abdullah of Saudi Arabia, a long time advocate of stabilized oil prices, announced last month that his

country would not increase production in order to lower prices. Given Saudi Arabia's refusal to increase production and exports, it now appears that no nation or organization has the spare production capacity to lower oil prices, suggesting that those major suppliers who have not yet peaked are operating at or near full capacity.

Venezuela – Recently Hugo Chavez closed the borders and claimed ExxonMobil's producing fields as its own.

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Consistent Reserve Reporting Required

In many major producing countries, the majority of reserves claims have not been subject to outside audit or examination. The following table shows suspicious jumps in stated reserves without associated discoveries, as well as the lack of depletion despite yearly production:

Year	Abu Dhabi	Dubai	Iran	Iraq	Kuwait	Saudi Arabia	Venezuela
1980	28.00	1.40	58.00	31.00	65.40	163.35	17.87
1981	29.00	1.40	57.50	30.00	65.90	165.00	17.95
1982	30.60	1.27	57.00	29.70	64.48	164.60	20.30
1983	30.51	1.44	55.31	41.00	64.23	162.40	21.50
1984	30.40	1.44	51.00	43.00	63.90	166.00	24.85
1985	30.50	1.44	48.50	44.50	90.00	169.00	25.85
1986	31.00	1.40	47.88	44.11	89.77	168.80	25.59
1987	31.00	1.35	48.80	47.10	91.92	166.57	25.00
1988	92.21	4.00	92.85	100.00	91.92	166.98	56.30
1989	92.20	4.00	92.85	100.00	91.92	169.97	58.08
1990	92.20	4.00	93.00	100.00	95.00	258.00	59.00
1991	92.20	4.00	93.00	100.00	94.00	258.00	59.00
1992	92.20	4.00	93.00	100.00	94.00	258.00	62.70
2004	92.20	4.00	132.00	115.00	99.00	259.00	78.00

Kuwait, for example, was reported by a January 2006 issue of *Petroleum Intelligence Weekly* to have only 48 Gb in reserve, of which only 24 are "fully proven." This report was based on "leaks of confidential documents" from

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Kuwait, and has not been formally denied by the Kuwaiti authorities. Additionally, the reported 1.5 Gb of oil burned off by Iraqi soldiers in the first Gulf War are conspicuously missing from Kuwait's figures. Colin Campbell, unWorld, 80'-95

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Timing of peak oil

Below is a summary of the various industry experts. Interesting to see that the major oil companies are furthest down on the list while a majority of the geologists and geophysicists are near the top.

The US government does know about the problem but do not appear to be doing much about it. In 2005, the US Department of Energy published a report titled *Peaking of World Oil Production: Impacts, Mitigation, & Risk Management*. Known as the Hirsch report, it stated:

"The peaking of world oil production presents the U.S. and the world with an unprecedented risk management problem. As peaking is approached, liquid fuel prices and price volatility will increase dramatically, and, without timely mitigation, the economic, social, and political costs will be unprecedented. Viable mitigation options exist on both the supply and demand sides, but to have substantial impact, they must be initiated more than a decade in advance of peaking."

WHY WOULD THE INTEGRATEDS NOT SEE THIS?

THEY HAVE THE BEST DATA AND SEE PRODUCTION CURVES
DECLINE?

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Implications of Peak Oil

Import Restrictions -

If consumption and policy change only occurs in reaction to high prices and shortages rather than a planned reaction to the threat of a peak, then the degree of economic damage to importing countries will largely depend on how rapidly oil imports, not necessarily production declines. In a post Peak Oil world, production drops in exporting country's will result in dramatically lower exports as the exporting countries keep as much of their production excesses in the country to ensure internal demand growth. Shortfalls in imports would cause extreme price inflation in importing country's economy.

For example, when the United States oil production peaked in 1970 a shock ensued until the transportation infrastructure was available to import enough crude to meet demand. Ten years of infrastructure investment was required before those import problems were resolved which led to the price collapse of the early 1980's and the return of cheap oil (imports).

Hoarding - The problem could be exacerbated if individuals begin to hoard finished fuels in an effort to create their own "emergency energy stockpile". at any one time there are about 54 days of stock in the petroleum storage system plus 37 days in emergency stockpiles.

Political situations may change dramatically and inequalities between countries that

have reserves and the ones that do not have reserves may become exacerbated.

Alternatives research will explode – no bad ideas – Wind, water, ocean, biofuels, transportation efficiency gains

Agriculture will be dramatically affected - Every energy unit delivered in food grown using modern techniques requires over ten energy units to produce and deliver.

Nationalism – Countries taking control of their own energy may exacerbate the problem. Major oil companies operating in Venezuela find themselves in a difficult position because of the growing nationalization of that resource. These countries are now reluctant to share their reserves." WHY DID VENEZUELA KICK OUT EXXON?

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What to do?

Institute energy data reform

Technology - Current technology is capable of extracting about 40% of the oil from most wells. Although future technology will make further extraction possible, the additional oil will come at an increased cost. Recent price increases have led to oil exploration in areas where extraction is much more expensive, such as in extremely deep wells, extreme downhole temperatures, and environmentally sensitive areas.

Expand all forms of supply - It is possible that a substitution effect will spur demand for alternate energy sources, such as coal or liquefied natural gas. This substitution can only be temporary, as coal and natural gas are finite resources as well.

Create a renaissance of alternative energy solutions...there are no bad ideas

Unconventional Reserves is a startwas heavy crude oil (Venezuela), tar sands (Canada), and oil shale (Colorado) are high-energy intensity projects that can never reach high volumes to offset significant losses from other sources. Moreover, oil extracted from these sources typically contains contaminants such as sulfur, heavy metals and carbon that are energy-intensive to extract and produce up to three times more greenhouse gases per barrel. There is a lot of potential with unconventional oil but the best analogy is "it is like have \$1,000,000 in the bank but only being able to withdraw \$10,000 each year".

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- Stop looking at inventory stockpiles as a barometer on how much oil we have.. it is never enough.

- 54 days in storage

- 37 day in emergency

- Continue to invest in infrastructure

- Rail vs. road

- Pipelines

- Storage

Conservation - The September 2005 sales data for all vehicle vendors indicated SUV sales dropped while small cars sales increased. Hybrid and diesel vehicles are also gaining in popularity.