

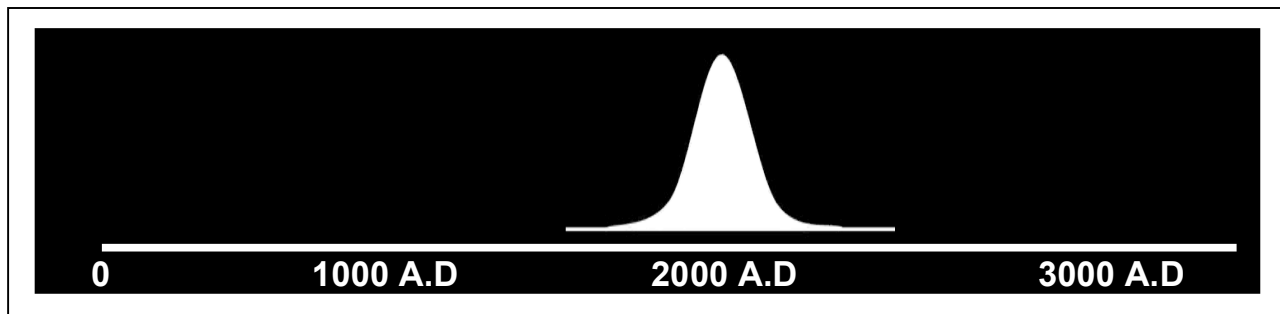
Peak Oil 101

We at Benchmark Advisory Services believe that these are very nascent stages of a very long-term bull run in Energy, particularly Oil & Gas. In our estimates, crude oil prices are set to soar, perhaps even cross \$200/barrel by 2010 and stay high subsequently. This is driven by a geological phenomenon called “Peak Oil” which is the focus of this article.

History of Fossil Fuels

When the energy history of the Earth is written, our consumption of Fossil Fuels on a very long timescale would look like what is represented in Fig 1 below. We started consumption of Coal around 300 years ago, Oil & Gas around 150 years ago and in the next 100 years, most of these Fossil fuels formed over millions of years would be virtually exhausted.

Fossil Fuel Consumption on Planet Earth



The problem for us happens not at the tail end of the Energy curve but at the mid-point, i.e. Peak, of the Energy curve. This is point at which production is the maximum and subsequent to this Peak, production would enter an “**irreversible decline**”. This decline would be continuous and independent of the market prices of these fuels. Many analysts confuse “Peaking” with “Running Out” – we are not saying that we are running out of Fossil fuels and we are quite sure that even 200 years down the line we would be producing some of these fossil fuels. But it would be very low quantities of poor quality energy commodities – perhaps as low as just 1-2% of what we produce today.

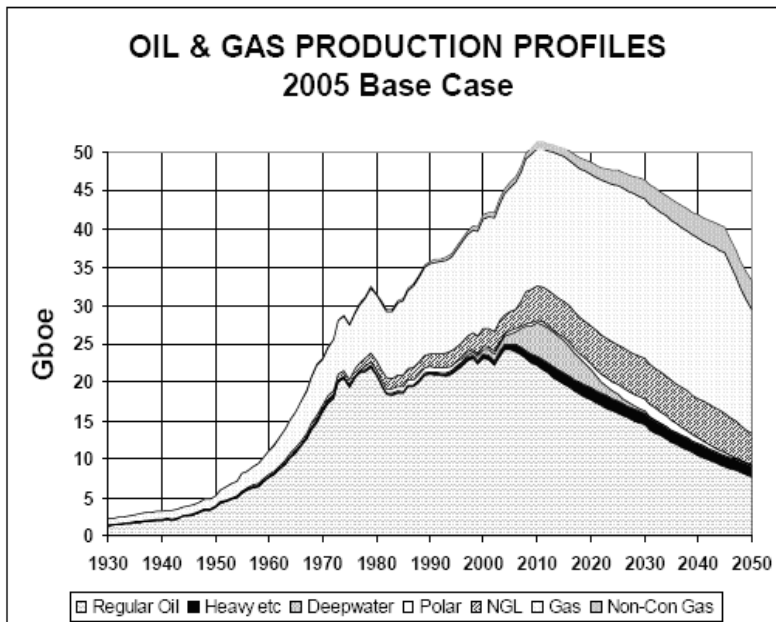
And quite unfortunately, there is very strong evidence that we are at the Peak of this energy curve right now. At this point, the marginal increase in Energy production is being driven by

Conventional crude and once we are past the maximum oil production (called Peak Oil), the decline of the total basket of Fossil fuels follows soon after – perhaps within as short of 2-5 years.

The Proof for Peak Oil

King Hubbert, a Geophysicist at Shell provided a rigorous mathematical approach for estimating Peak Oil and using that, Hubbert had predicted during the 1960's that the world Oil production would Peak by 2000. The fact that Oil production did not peak by 2000 was primarily on account of the Oil crises of the 1970's (that temporarily set-back demand) and the addition of non-conventional crude to the mix.

With the same methodology as was used by Hubbert, Prof. Ken Deffeyes, a former colleague of King Hubbert at Shell, calculated that Oil production actually peaked during Dec'2005. & the declining production for the first 6 months of this year certainly seems to confirm the prediction. ASPO (Association for the Study of Peak Oil & Gas) calculations indicate that for the combined package of Oil & Gas, the peak of production would happen by 2010. The production profile as per their estimates is given as under:



source: ASPO

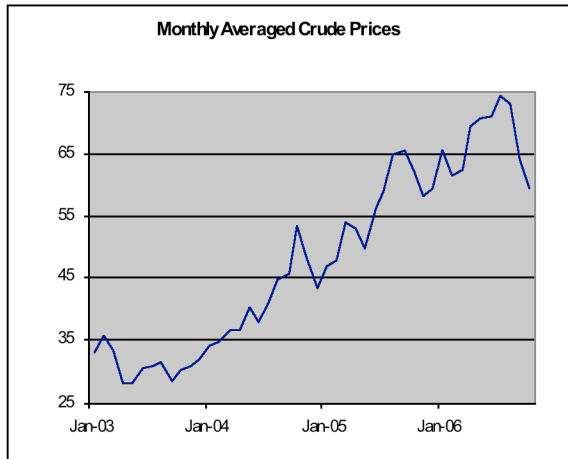
We are very sure that the readers would have lots of questions at this stage. Some of the often asked questions regarding Peak Oil are the following:

- What is the basis for Hubbert's predictions and what is the evidence that his methodology is correct?
- What are other methodologies for predicting Peak Oil and what are those estimates?
- What about all the new planned capacity additions planned till 2010? Why will they not add to the total production capacity?
- The Reserves of non-conventional oil such as tar sands, shale oil and gas hydrates are touted at between 4 to 7 trillion barrels. These are huge compared to the total conventional oil consumed till date of around 1 trillion barrels. So why can't we add to our capacity from these sources?
- Why can't we scale up the infrastructure associated with the Energy industry?
- This is not the first time that people have predicted about an Energy crisis. Even in the 1970's when oil prices shot up dramatically, claims of \$100/barrel were made even then. So what is different this time?
- Why can't we add to our reserves by discovering more oil fields with expanded exploration activities?

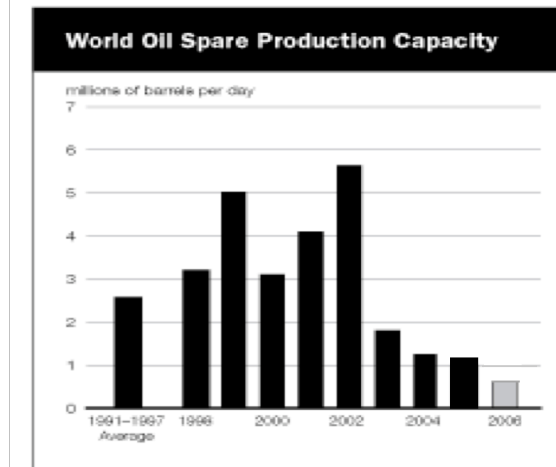
These are very practical questions requiring detailed explanations. We write a monthly column in Business Line titled "Hubbert Speak" where we explain the above issues and as to why none of the above would meaningfully alter the timelines of Peak Oil. These columns can be accessed at <http://kinghubbert.blogspot.com/>

Price Volatility destroys Market Signals

One of the premise of Efficient markets is that price signals to the markets creates awareness and alternatives. But when the price increase is accompanied by high volatility, such as the case with Crude Oil (& even more so for Natural Gas), then the signals become very confusing.



Source: econstats.com



Source: EIA, Apr 2006

The fundamental reason for the oil price volatility that we are observing in the last few years is the disappearance of spare production capacity. This is exactly the same behaviour as could be predicted from Queing theory of a system operating at full capacity. When a system operates at or above rated capacity, then response times becomes erratic and unpredictable. Similarly, due to our Just-In-Time oil production systems, any small external event – whether a cold winter, hurricane in the Gulf of Mexico or shutdown of a pipeline either due to leakages or terrorist strikes leading to either excess demand or loss in production creates wild price swings.

As we have explained in our July BL articles, this spare capacity is very likely to get into the negative territory by 2008. This is likely to send prices soaring compared to the current “historically” high levels. & when this is accompanied by declining production post “Peak Oil” in the subsequent years, prices would get “dizzy”.

Oil is also a commodity that cannot be inventoried. The much-touted “Strategic Petroleum Reserves” in the US can hold only about 2-4 weeks of US requirements depending on whom you choose to believe. Hence given the demand inelasticity of oil, most purchases have to be made in the prevailing spot markets and this would cause the prices to zoom (as happened during the 1970’s crises) in the event of a supply reduction.

How High is High?

Firstly, even at the recent high price of \$78/barrel, crude is unbelievably cheap. It’s the single most precious commodity that we use today and even a casual comparison would tell you that it is still the cheapest liquid that can be purchased in the US. It’s even cheaper than mineral water.

In India ofcourse, water is cheaper... but still we pay more for Coke and Pepsi, which are nothing more than syrupy water, as compared to the international price of Crude.

Liquid	Price per Gallon (in US)
Crude Oil (at \$78/barrel)	\$1.85
Low-fat Milk	\$3.79
Evian Spring Water	\$6.40
Coca-Cola syrup	\$8.20
Budweiser	\$8.88
Kikkoman Soy sauce	\$15.33
Red Bull Energy Drink	\$30.69

All we can say is that it's unfortunate that we have been used to an artificially low price of oil that did not reflect it's economic value, scarcity, lack of easy substitutes and non-renewable nature. Oil prices would have to double or triple from the current levels merely to have a price comparable to some of more commonly used liquids.

Conclusions

There are solutions to the problems of Peak Oil – but nothing which could be implemented in a short timescale. A study conducted by Dr.Robert Hirsch, Senior Energy Program Advisor to the US Government, indicated that mitigating the impact of Peak Oil would take a 20-year crash program. & today, we are nowhere close to even starting on one.

We are great believers in the Response system of our society and hence we are actually optimistic on a long-term basis (15-20 years+). But in the meanwhile, we are in for a very rough ride on the energy front. Business-as-usual would be unlikely beyond 2010 and companies that are not prepared to handle the emerging scenario would face a highly disruptive business environment. At the same time, Peak Oil also represents a great opportunity for companies that can foresee the emerging situation and evolve strategies to benefit from the same.

About Benchmark Advisory Services

Benchmark is a firm specializing in Strategic Consulting. We focus on specific Megatrends and help companies tailor their Business Strategy to benefit from these emerging scenarios. Some of the trends that we Consult on include Peak Oil, World Economic Outlook & Demographic Patterns.

Given the nature of our work, we are highly research-driven organization. The output of our research is frequently published in leading magazines and journals. Some of our published articles can be accessed at the following links.

Peak Oil: <http://kinghubbert.blogspot.com/>

Finance: <http://financial-musings.blogspot.com/>

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