The Oil Drum: Australia & New Zealand
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

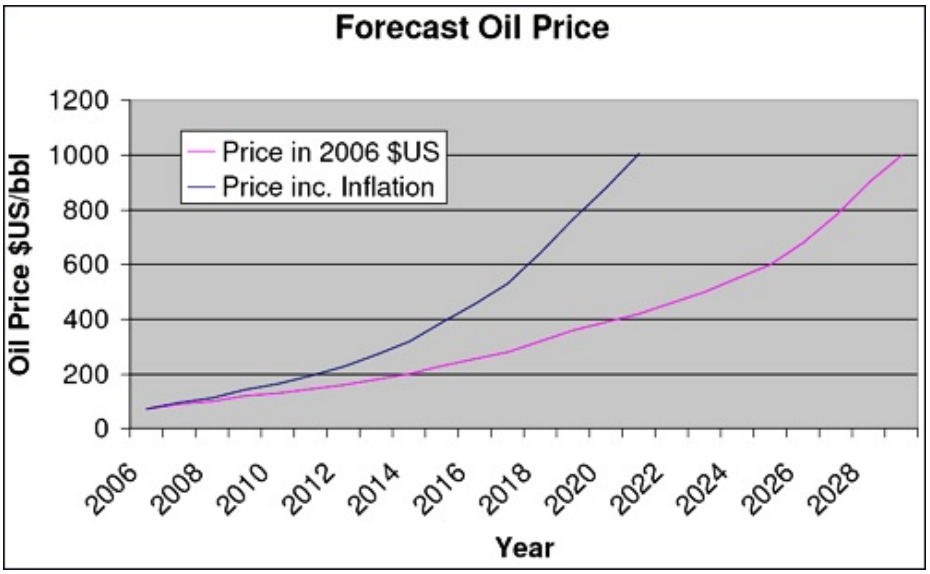
$100 a barrel: Going, Going....

Posted by aeldric on May 6, 2008 - 7:00pm in The Oil Drum: Australia/New Zealand
Topic: Demand/Consumption
Tags: demand destruction, oil, oil prices, peak oil [list all tags]

This is a guest post by **Phoenix**, an engineer working in the energy sector, and a friend of mine for well over 3 decades.

In January 2006 Phoenix emailed me a spreadsheet that predicted an oil price of $100/barrel by 2008, followed by an ongoing geometric rise in oil prices. I remember immediately phoning him to point out that the scenario was impossible because it is unsustainable - $100/barrel would cause economic havoc comparable to the oil shock of the 1970s and if a geometric price progression followed, then no economic recovery would be possible and... well, I recall using the phrase "rioting in the streets inside of 18 months".

As we know, oil hit $100 in January 2008 and kept climbing, surpassing even Phoenix's predictions. So when Phoenix offered to explain the model that generated those numbers, I leapt at the opportunity. Here is the story of how Phoenix became Peak Oil aware and generated his Price Calculator.



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Going, Going .... Gone

So what's a barrel of oil really worth?

At the start of 2006 I became peak oil aware. Most of the readers of TOD will have lived through the turmoil of concern and dismay that this realisation usually brings on. In the months following, I proceeded to digest as much information on the topic as I could. However, after a time I noted

that, while there was an abundance of predictions on amounts of oil and the depletion rates, there was little in the way of forecasts as to the future oil prices that would result.

At that time (and still today) I was an avid believer that the consequences of oil depletion will unfold as an economic crisis rather than as direct impacts from the shortage of energy. This being the case then why was there virtually no debate or a plethora of predictions as to the long range prices?

Perhaps everyone was relying on the output of the IEA for such forecasts? A quick review of the IEA numbers at the time was distressing. They were forecasting a drop in the price back to the US$40-$50 range. Even worse, world governments were probably using these predictions to set energy, social and infrastructure policy. I decided for my own piece of mind, to attempt to generate a simple model for predicting the long range oil price.

Basic Theory
Traditional oil market economic theory seems to be modelled around the notion that the price for a commodity is simply a reflection of the input costs. Markets, while they may experience temporary upsets due to imbalance between supply and demand, through the forces of competition will correct themselves so that prices are governed by costs.

Being an engineer rather than an economist I felt at liberty to toss the above theory out the window. It seemed to me overly reliant on the concept that the world was infinite and that markets always have the capacity to expand to meet demand.

Instead I started from the premise that the production of a commodity is limited. Of all those people vying for the commodity someone inevitably will miss out. They will not be able or willing to pay the market price. The price then will be governed by the maximum amount that this person is prepared to pay.

Supply
The starting position for the model was the prediction of oil supply rates over the future 30 years. As mentioned above there are many, many predictions concerning these numbers. I had to select one based on a consensus of the data available. I used a simple bell curve with the following parameters:
- peak of 85 Mbpd in 2007
- ultimate remaining capacity 850 billion barrels
- standard deviation set to give a depletion rate of 2.7 % by 2020
I am sure there will be a range of views on the veracity of these numbers.

On top of this base supply number I had to account for the growth of alternative fuel substitutes that will inevitably develop as the oil price climbs to a point that makes them viable. Predicting the capacity and ultimately the take-up of these alternatives is a little tricky. I lumped these into two areas:
- Alternative fossil based fuels (Oils sands, Coal to Liquid and Gas to Liquids)
- Renewable fuels
Against each of these I assigned an estimated * maximum capacity that was achievable and a price sensitive take-up rate.

Demand
As indicated above my basic premise for the model was demand destruction due to price sensitivity. To facilitate this I divided the demand into a number of economically predictable groups. This division was somewhat compromised by the necessity to obtain current consumption rates for these groups. The first division was made between OECD and non OECD countries. Within this I divided into the following sectors:
- Personal Transport
- Public Transport

- Heating
- Industry
- Shipping
- Air Transport
- Military
- Power Generation
- Products

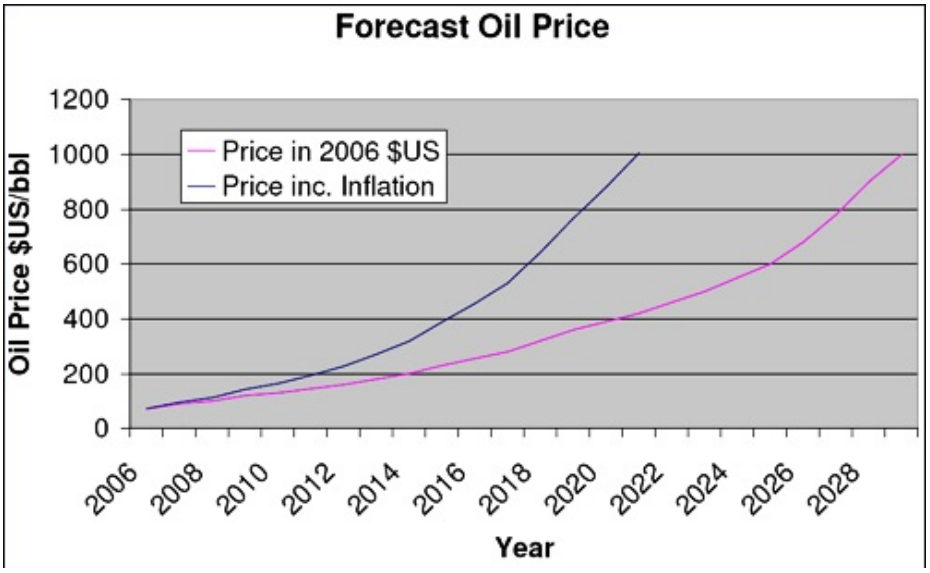
Even this list involved a degree of interpretation *of the available data on consumption.

Against each of these sectors I assigned * a price sensitivity profile. As far as I have been able to research there is no definitive numbers or reported figures for these profiles. In my research I have come across a number of reports that provide indications for particular national groups. Where possible I have ensured that the profiles I have used are consistent with these reports. For the most part, however, these numbers are based on my personal experience and the experience of some of my associates. This is not ideal but it is the best I could do.

Model
I constructed the model in spreadsheet form. It simply compares the demand and supply and determines the price level necessary to suppress the demand to meet the supply. I have set the model up on a yearly period going out to 2040.

Results
Having run the model for the last two years I have noted the following:
- The results while fairly accurate in emulating the observed market price for oil, do not take into account a number of distorting factors affecting the market. These factors include, supply disruptions and the human factors (greed and panic) that affect any market.
- The prices are on a 2006 USD basis. I subsequently added an allowance for inflation into the analysis. Anyone want to take a guess at what inflation will be in 30 years time? I have used a consumption- weighted figure between OECD and non-OECD current inflation rates and applied it to all future years.
- There will be an increasing trend for governments to hoard and lock up future supply. I have made a very rough attempt to * forecast the volume and timing of this factor in the spreadsheet. My view is that by 2030, all traditional oil sources will be subject to this government interference. Hence the above curve only represents the market price up till that time.

See the oil price prediction curve below:



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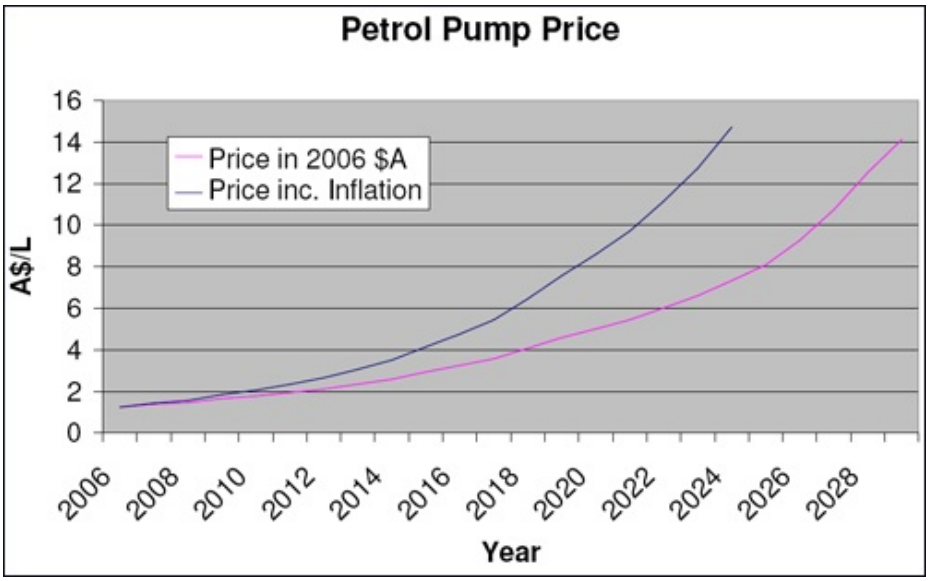
For Australian readers I have translated these numbers into a predicted pump price for petrol.



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Future Development

As can be seen from the above, the model generated suffers from a number of limitations (highlighted by *). For the most part these limitations spring from the extremely limited resources available to an individual. Yet despite this the results are considerably better than the IEA predictions.

In order to improve the accuracy of the model I intend to undertake the following revisions :
- Further division of the demand sectors with a separation of China/India from the non OECD group.
- Generation of separate sectors for essential services and perhaps agriculture in order to get a clearer idea of the likely effects government intervention may have on the demand.
- Incorporation of feedback on secondary demand destruction resulting from economic slowdown.

I hope the above curves form a useful discussion point for TOD members.