The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Where we really stand with respect to oil and natural gas supplies

Posted by Heading Out on September 29, 2009 - 8:39am
Topic: Supply/Production
Tags: natural gas production, oil production [list all tags]

A few days ago, I gave a presentation in Poland that talks about how much difficulty the world is having maintaining its oil production. The presentation was not set up to be a response to Jad Mouawad's recent *New York Times* article, Oil Industry Sets a Brisk Pace of New Discoveries, but in many ways it is one. Our recent discoveries really have not been enough to make up for our many production problems elsewhere. We are having problems not only with oil, but with natural gas. The solution the financially distressed world is increasingly considering is . . . well, read the story to see.

I began with a slide that shows the current top crude oil producers in the world (based in EIA May figures) and noted that, at the moment Russia is at the top.

Top Crude Oil Producers
May 2009 EIA Data

Country	Current mbd	2004 mbd
Russia	9.39	8.80
Saudi Arabia	8.11	9.10
United States	5.28	5.42
Iran	4.00	4.00
China	3.78	3.38
Canada	2.67	2.40
Mexico	2.61	3.38
Iraq	2.42	2.01

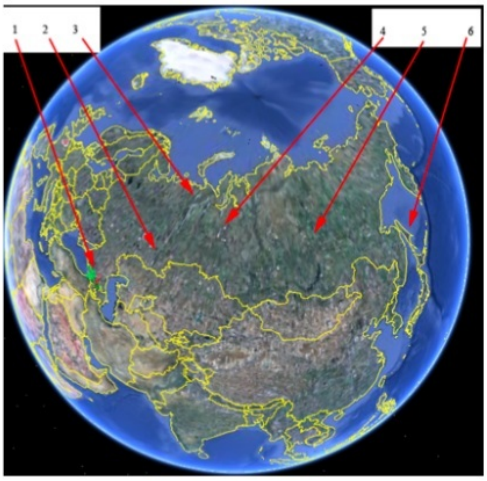
Then I showed a slide of a well in Samotlor and noted that the Russian historic large fields are running out. Samotlor has declined from 3.2 mbd to 750,000 bd and is pumping, in some wells, 90% water. The Russian strategy has been to find and produce a region until exhausted, and then move East to find the next major deposit. That has worked fine as a strategy until now when they have reached Sakhalin Island – on the far East of the country – the next logical place to look is . . . . .

Russia is beginning to decline

Russian discovery sequence

1. *North Caucasus*
2. *Volga-Ural*
3. *Timan-Pechora*
4. *West Siberia*
5. *East Siberia*
6. *Sakhalin Island*

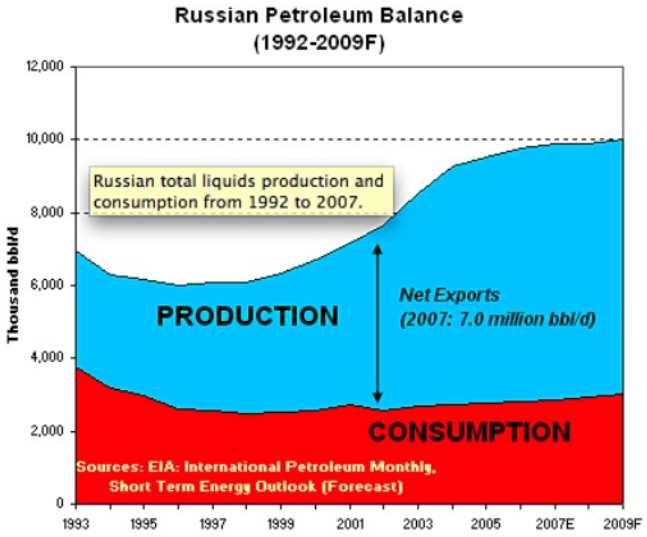
Moving East there was more oil – but it is in Alaska.



Alaska, and sorry folks, that is already in play, and in fact rather played out.

Which is a good point to introduce the Export Land Model and so I talked just a little about the fact that as a country's oil peaks and starts to fall, domestic consumption becomes more important and exports suffer a much greater decline than the actual fall in production. Then I showed how this was already happening to Russia, and the impact that this would have on Poland.

Russia is now beginning to reduce exports as internal demand rises



To make life even more complicated in terms of those in Eastern Europe with a reliance on Russian oil, I put up a slide showing that the United States is now importing some 840,000 bd of Russian oil, in order to meet its needs, and thus Europe is now competing in the global market for that oil.

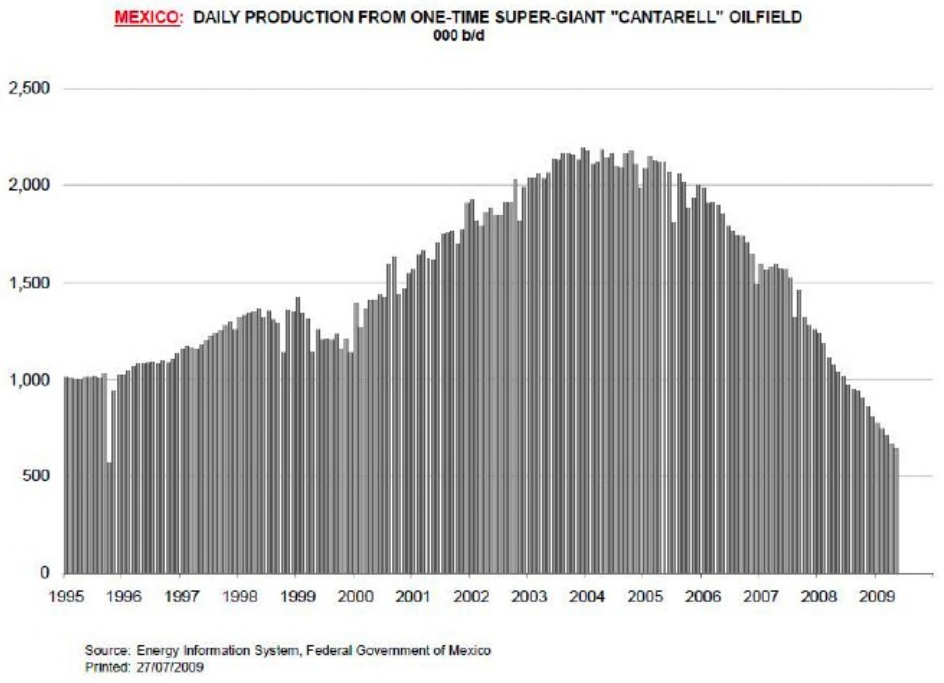
Now where does the United States get its oil?

- *In May 2009 this was roughly 12 mbd, divided roughly into 4.63 mbd from OPEC and 7.36 mbd from non-OPEC sources.*

Country	Mbd	Country	mbd
Canada	2.28	Nigeria	0.62
Venezuela	1.38	Angola	0.52
Mexico	1.23	Brazil	0.40
Saudi Arabia	1.12	Algeria	0.28
Russia	0.84	Iraq	0.27

(Source EIA)

Why must America compete in that market – I used a graph showing the collapse of Cantarell (not to mention the other fields in Mexico) and the 100,000 bd fall every three months to show that America has to go to the world market to find the oil that it now needs.



Non-OPEC crude oil production has peaked and is in decline (I used an Oil Drum graph showing the fall since 2004) and so when one looks at countries that have a surplus of production over current supply (comparing IEA and EIA data) the stand-out is Saudi Arabia at either 3.3 or 2.5 mbd (depending on whom you believe) with the next largest being the UAE at somewhere between 0.3 and 0.6 mbd.

IEA and EIA estimates as to who has what in surplus (May numbers)

IEA Estimate		EIA estimate	
Country	Mbd	Country	Mbd
Saudi Arabia	3.3	Saudi Arabia	2.5
UAE	0.58	UAE	0.3
Angola	0.4	Angola	0.28
Iran	0.22	Iran	0.1
Libya	0.23	Kuwait	0.3
Qatar	0.13	Qatar	0.24
Others	0.44	Others	0.72

These are the countries that can produce more, but the Saudi number is at least 1 mbd too high, and the total is around 4 mbd

(And here let me briefly digress to point out that those who wave the NYT story have little clue of the time that it takes between discovery and full field production – nor do they understand oil field depletion, or that just because we have passed peak production does not mean that there is not a whole lot of oil out there that is still waiting to be discovered – only that it is going to be less than the huge volumes that we have already found and exploited).

The problem, as I pointed out, is that the Saudi number includes, among other fields, Manifa, and Yes! we know it is there; Yes! we know that it can produce 1 million bd; but we also have to recognize that until a refinery is built to process that oil (which will not now come on line until after 2013), the use of that production number is a fiction. And thus there is less than 4 mbd available as a current world reserve.

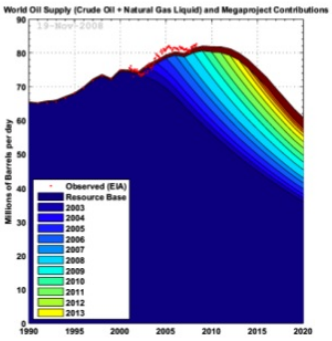
So what else do we need to worry about? Well, it was time to introduce oilfield depletion and so I put up the two contrasting graphs that I use from the Oil Drum that show decline in current fields when you use 4.5% depletion and then 5.25% (the significant point I indicated was the transition of peak oil from 2011 to 2008).

Future world production

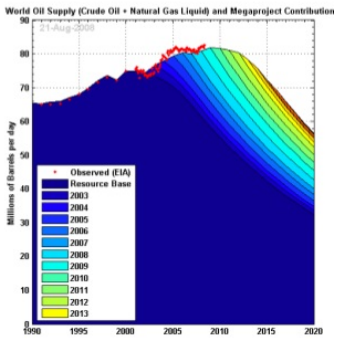
In 2005 a friend and I started an Energy Blog called The Oil Drum.

The Oil Drum survey of new and old production looked at the depletion of major fields:

Decline 4.5% Peak 2011



Decline 5.25% Peak 2008



I then showed a slide with the Financial Times quote that the oilfields in the North Sea were depleting at 9%, and followed it with Dr Fatih Birol's comment that the depletion rate is 6.7%.

I tied the whole issue together by showing the need that the Western world will have as their economies rebound (about 3 mbd) with the increases in demand from China and India (already 1 mbd and rising) to show that by 2011 we will need some 5 mbd of additional oil over today, but at best have only enough on line to get 4 mbd. (The first Oops Moment).

As the global economy returns to good health

- *Demand will increase "normally" back to the levels before the recession (up 3 mbd)*
- *But Chinese and Indian demand will increase further, it is already up almost 1 mbd over 2008.*
  - *China has the largest market for cars – VW sold 128,000 in July*
  - *India sells 100,000 Tata Nano's a month (1.4 million total 2008)*
- *If the recession ends say next year, then assume another 1 mbd increase in Chinese and Indian demand.*
- *Simplistically demand will rise over previous peaks to reach more than 5 mbd increase in 2011.*
- *But there is only 4 mbd or less available.*

So now I turned to the second fuel – natural gas – (time was now running a bit tight so this got a little less intense treatment, but also focused on the Polish need).

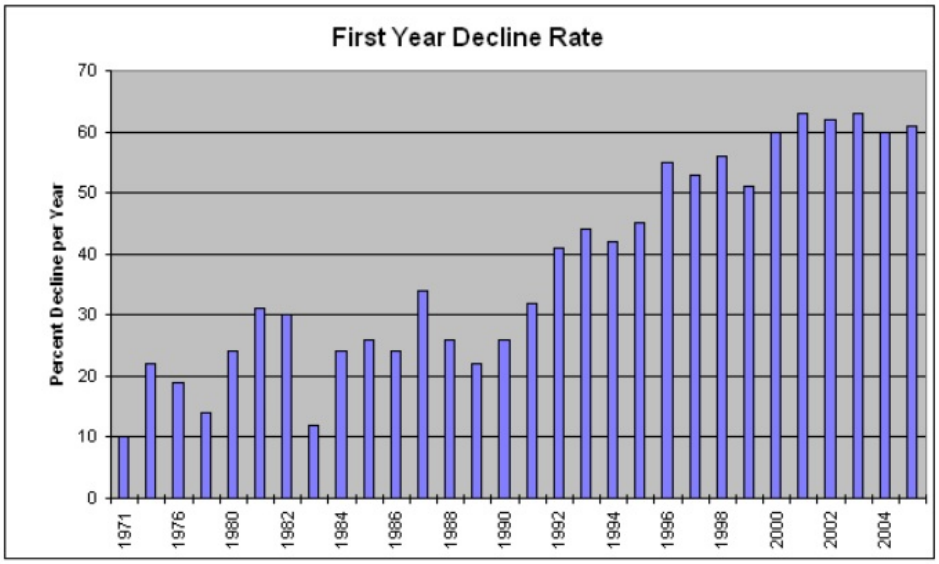
I began with a slide showing that, over time, natural gas fields were lasting a shorter period of time before they ran out, but then followed this with a slide of Turkmenistan, who has been supplying some 40 bcm to Russia (or thereabouts) for transfer (at a profit) to Ukraine, Poland and Western Europe.

To ensure that supply last year (and there were posts on this at the time) Gazprom signed an agreement to pay the prevailing Western price for natural gas to Turkmenistan. Since then there was a collapse in the world price of natural gas, putting Russia in an awkward postition--a contract to buy at a high price, and to sell at a lower one. An "accident" to the pipeline between Turkmenistan and Russia happened a few months later, meaning that Russia has not had to accept expensive NG that it has to sell at a loss, since then.

However, just as Russia pressures Turkmenistan to accept a new agreement to sell the gas at a cheaper price, the new pipeline from Turkmenistan to China will open in a couple of months (and I showed the map) meaning that, as China has been willing to pay the higher price (about $8 per kcf as I posted recently) they have underwritten a cost increase for NG to Western Europe, and beyond that is unlikely to go away.

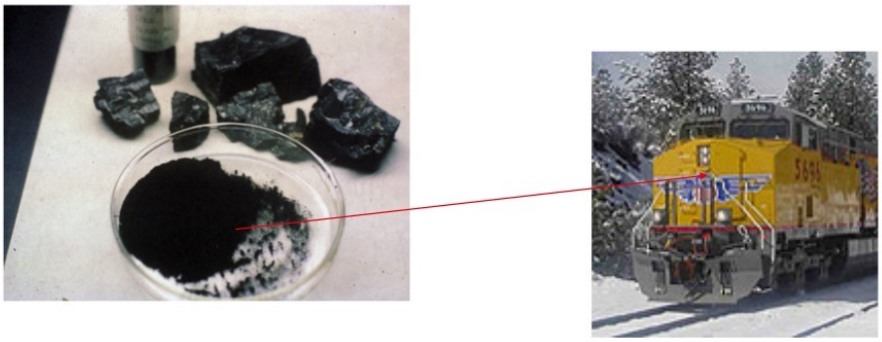
I then quickly put up a map showing the gas shale deposits in the United States and commented that this might at first appear to indicate that we are entering the "Age of Natural gas".

But then I followed this with Swindell's graph showing that the new wells suffer 60% decline in the first year, and commented that with the high cost of wells, and the current low cost of NG in America (I tried converting prices to zloty per thousand cu m., but may have got a number wrong – we passed a gas station that was selling NG at 2 zloty per liter) the new wells that we need for next year are not being built. Thus we may be competing with Poland for LNG from Qatar.



What is left? I turned to coal (Poland currently gets around 85% of its electrical energy from this source) and I put up my final slide, showing 5 micron coal – which when mixed with 50% water will run a diesel locomotive (and I added a picture of one) as GE have demonstrated.

There will be, as a result, greater coal use.



Improve the design of crushing equipment so that coal can be reduced in size to < 5 micron (where it can be mixed with water and used in diesel engines). GE has tested this in their locomotives, under DOE funding.

Which barely gave me time to note that for many countries in the world coal, is the only available, viable and economically practical fuel (for example, Vietnam and Botswana) at a time when (with a map from "energy shortages") - which I contrasted with comments from the G-20 Summit - the world is already having serious problems and it was time for me to conclude.