The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Why peak oil is probably about now

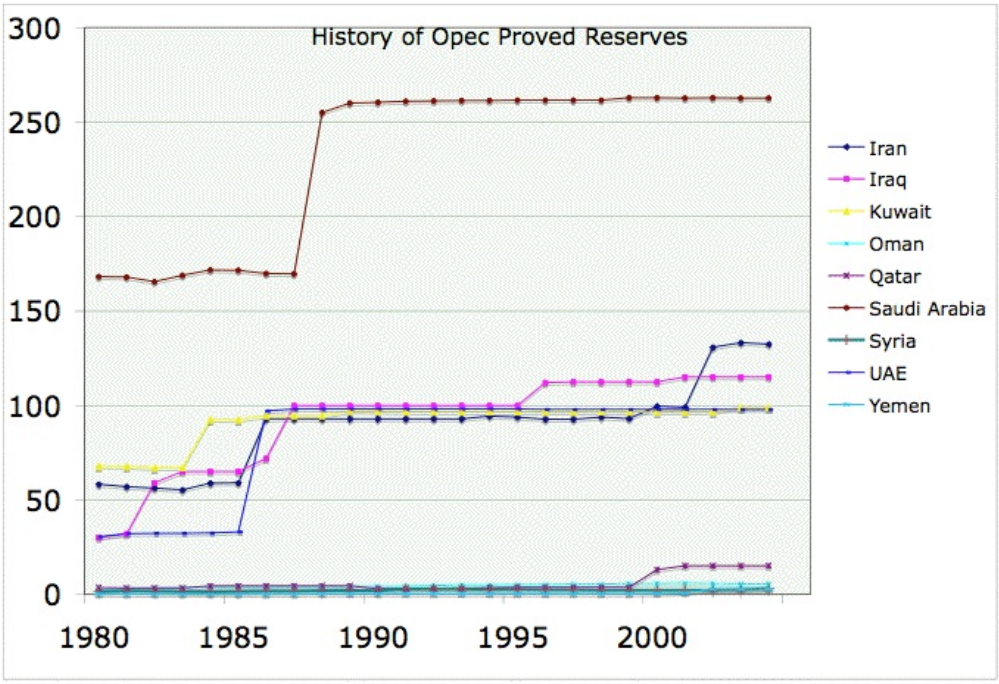
Posted by Stuart Staniford on March 1, 2006 - 6:12am
Topic: Supply/Production
Tags: hubbert peak, peak oil [list all tags]

This post is for the benefit of those readers whose friends or relatives just spat out their coffee over their morning New York Times in surprise that oil is starting to run out and nobody warned them before now. If you are looking around for more background information, I would like to summarize a series of arguments and analyses that have led me to the view that peak oil is most likely occurring about now, give or take a year or two. My personal coffee-spitting incident occurred about a year ago, and this is some of what I've figured out in the meantime.

This is a quick summary of past analyses with links for further detail.

There's a very good chance claimed OPEC reserves are exaggerated.

Here's the history of how much OPEC nations have claimed to have in their proved reserves (oil that they should almost certainly be able to produce with existing technology and prices).

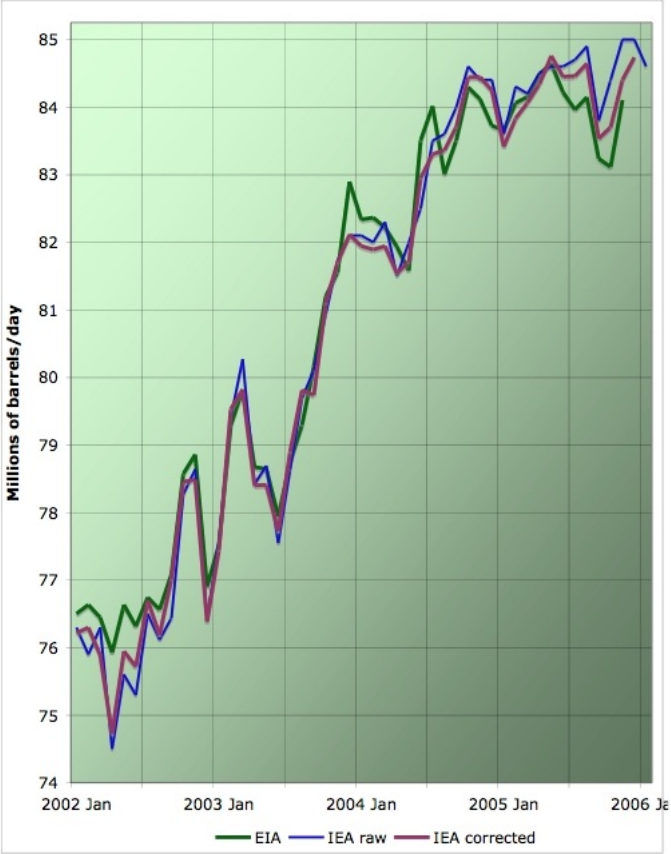


History of OPEC claimed proved reserves in billions of barrels (also known as Gigabarrels = Gb. A barrel is 42 US gallons). Source: BP Statistical Review of World Energy. Click to enlarge.

Note that OPEC production quotas are in part dependent on proved reserves - giving these

countries an incentive to exaggerate. The huge jumps in reserves were not associated with the discovery of any particular large new fields. These time series are extremely implausible on their face and suggest mendacity. The truth may be starting to come out. Recently, Petroleum Intelligence Weekly got hold of internal Kuwaiti documents indicating their true reserves were less than half the claimed value. This is a key point. 2/3 of the world's claimed remaining reserves are in OPEC countries, and all scenarios that assume peak oil is more than ten years away assume that OPEC can substantially increase production from present levels.

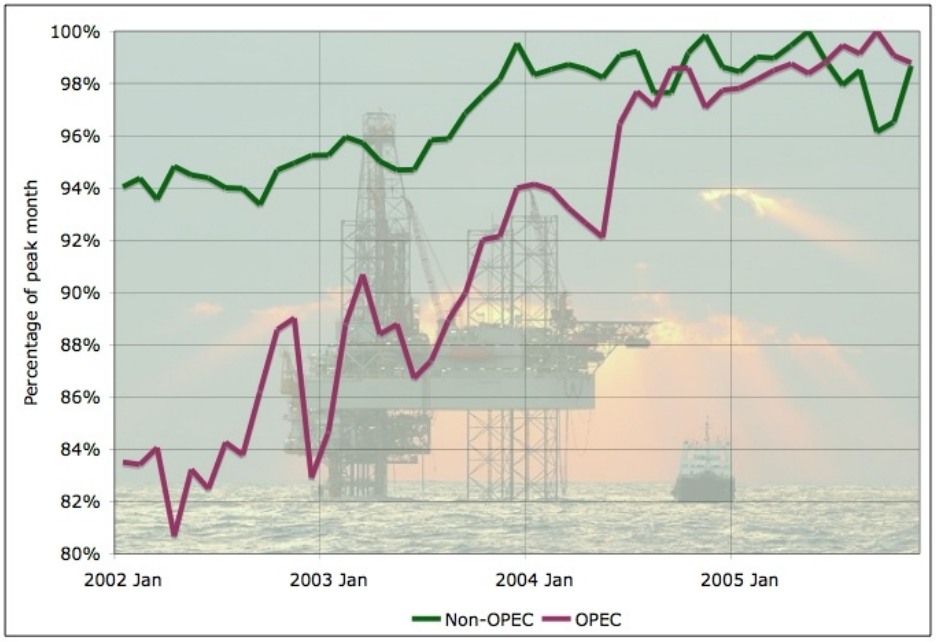
World production stopped increasing in late 2004.



Average daily oil production, by month, from various estimates. Click to enlarge. Believed to be all liquids. Graph is not zero-scaled. Source: IEA, and EIA. The IEA raw line is what they initially state each month. The IEA corrected line is calculated from the month-on-month production change quoted the following month.

As of right now, production has been flat-but-bumpy since late 2004. The peak month of production is presently May 2005. This is true despite high oil prices giving strong incentives to produce more oil. Lack of refinery capacity is often cited as an alternative explanation for this. If this were true, heavy hard-to-refine oil would be cheap. It isn't.

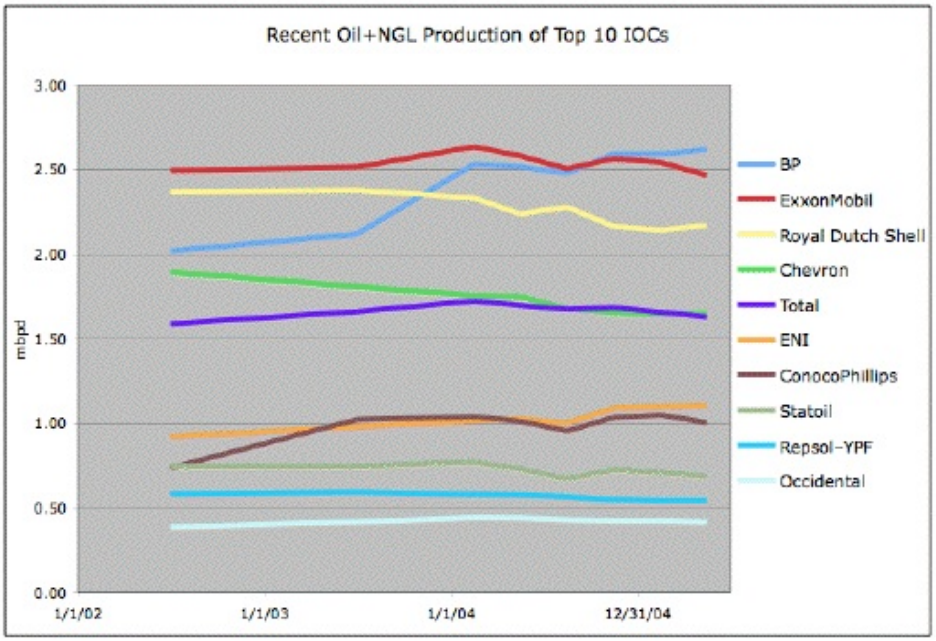
Both OPEC and non-OPEC oil production appears to be approximately plateaued at present:



Average daily oil production, by month, from various estimates for OPEC and non-OPEC as a percentage of their highest month (May, 2005 in the non-OPEC case, September 2005 in the OPEC case). Click to enlarge. Believed to be all liquids. Graph is not zero-scaled. Source: EIA.

Decline rates of existing production are very high

The major international oil companies have not been able to increase production for some time, despite strenuous efforts (the notable exception is BP which has had access to resurgent Russian production via a subsidiary).



Average daily oil production for top 10 publicly traded international oil companies. Source: Petroleum Review.

An analysis of Exxon's production suggests the problem. Their existing production apparently declines at rates varying from 6% to 14% per year. Thus all the new projects they bring on

stream each year just serve to offset the declines in their current fields. This strongly suggests they are at or near peak. More recently, it emerged that in 2005, they hardly replaced any of their oil reserves - instead almost all of the quoted energy reserves they developed were actually natural gas (in Qatar). Shell is even worse off - they only replaced 60%-70% of production in 2005, and only 19% in 2004.

The situation does not appear to be much better in OPEC. According to the US EIA, Saudi production is declining 5% to 12% each year. So they have to bring on that much new production just to stay level. Similarly, Iranian production is estimated to decline 8%-13% each year.

This to me is the most compelling argument that we must be close to peak oil production. The amount of new production required every year just to stay level is enormous. We know this was the main symptom of US peak - all quotas were removed (oil production in Texas was managed via a quota system), and despite strenuous efforts to increase production, it never could climb higher. It is noteworthy that a number of OPEC officials were quoted in 2005 saying that OPEC was producing everything it could with effectively no quotas.

Hubbert Linearization points to peak oil

Given that reserves data cannot be relied on in many important cases, peak oilers are fond of using an extrapolation method from production statistics originally due to Hubbert. While the technique has its uncertainties, and may not be applicable to all countries, it did a decent job of predicting the US peak in production back in the 1970s. This method suggests the world is close to peak now. This is the basis of Professor Deffeye's famous Thanksgiving 2005 prediction. My own analysis suggests a peak of May 2007 ± 4.5 years (so Professor Deffeyes prediction, for which he doesn't cite an uncertainty, is within my error bars - there are differences between different production statistics which lead to slightly different answers).

At least one major oil company is warning us

Chevron has been running an ad campaign called Will You Join Us. They are warning everyone that it is getting extremely difficult to find and produce more oil, the world is consuming much more than it discovers, and we should be thinking about conserving. Why on earth would they want us to conserve their principal product if there was plenty of it?

The price of oil keeps going up.

At around $60, prices over the last year or so are the highest they've ever been in the absence of a major oil shock. They are also very volatile - any hint of disruption can cause a several percent change in price in a day. Prices are now high enough that demand has stopped increasing at least for the time being, and stocks keep building - suggesting the market is nervous and wants more oil on hand.

There is no evidence of Saudi spare capacity

Saudi Arabia is claimed to have some spare capacity (the only nation for which this is currently claimed). There is no evidence of it in production statistics. Their reported production has been flat for a year, and they did not increase production at all in response to the hurricanes in September 2005. It's possible they have some spare production from the Manifa field; however, it is unrefinable due to high Vanadium levels:

Saudi and Russian average daily oil production, by month. Click to enlarge. Believed to be all liquids. Graph is not zero-scaled. Source: EIA Table 1.1.

There are geopolitical and climatic risks to the existing production level

Whether its suicide attacks on Saudi oil facilities, tension over Iran, Nigerian rebels, the Iraqi resistance, or hurricanes, little things keep going wrong and threatening to turn into bigger problems. If any one of these situations significantly worsened their impact on oil supply, given the very tight market already, we would immediately be in a serious oil shock that would likely set in motion major demand destruction extending over a number of years.

In Summary

While no one piece of evidence is conclusive, I find the overall picture here to be suggestive that oil production is close to its peak value and is not likely to increase too much more. Whether May 2005 will stand as the highest ever month of production or some month in 2006 or even 2007 rises a little higher is certainly hard to call. However, I would be quite surprised if the world is able to bring enough new production on stream to overcome those high decline rates in existing production for much longer. And with each passing year, it's only going to get harder to do.