

EMERGING SIGNS OF OIL DEPLETION – WHERE REALITY MEETS THEORY

Chris Skrebowski BA, FEI,

Editor Petroleum Review, Board member Oil Depletion Analysis Centre (ODAC)

cs@energyinst.org.uk

The aim of the analysis is to establish data that shows oil depletion is a real and increasing reality and to determine the likely timing of 'Peak Oil'. It remains a fact that overall production will decline once the overall volume of production coming from countries that have declining production exceeds that from countries where production is still expanding. This point is what is usually referred to as 'Peak Oil'. Even at this point oil will be being discovered and put into production and roughly half the world's producing countries will still be expanding their production.

The approach used relies on the fact that production data, within definitional constraints, is the most reliable and least contestable of all the datasets used to analyse oil depletion. Careful comparison of production data from the BP statistical Review 2004, the latest IEA production data and the production figures printed in the Oil & Gas Journal was made. This showed that in both 2003 (all three sources) and 2004 (only the latter two) the loss of production in countries where production decline is already established were running at 0.9-1.1 million barrels/day in both years. An analysis of the BP Statistical Review data published in the August 2004 edition of Petroleum Review Established that in 2003 around 28% of production was already coming from countries where production decline was clear and sustained. In 2003 some 18 major producers were in decline. In fact nearly 60 oil producing countries are now in decline but the BP Statistics confine themselves to itemising the larger producers. The producers that, in 2003, were in decline were (2003 production in parenthesis): USA (7.45mn b/d); Norway (3.26mn b/d); Venezuela (2.99mn b/d); UK (2.25mn b/d); Indonesia (1.18mn b/d); Oman (0.82mn b/d); Argentina (0.79mn b/d); Egypt (0.75mn b/d); Australia (0.62mn b/d) and Colombia (0.56mn b/d) as well as the smaller producers Gabon,

Cameroon, Congo (Brazzaville), Tunisia, Peru, Romania, Yemen and Uzbekistan. Collectively these eighteen countries produced 22.13mn b/d in 2003 or 28.8% of total production. Examination of alternative production data leads to similar conclusions. Exact comparison is not possible because of variations in definitions and countries covered.

The analysis is then progressed by examining the likely way that depletion will progress in the countries where production is in established decline. In the case of the BP Statistical Review data it is found that in 2003 annual decline rates averaged 4.91% but that this concealed a wide decline range from Gabon's 18.64% and Australia's 14.64% to the USA's 2.26% and Egypt's 0.4%. Taking a three year average narrows the range of depletion rates but does not significantly alter the pattern or the countries affected.

The next stage in the analysis was to look at producers that are likely to move into decline in the next few years. There are good reasons for believing that Denmark and probably Malaysia will move into decline in 2005. The expectation is that Mexico and China, both producing well over 3mn b/d, will start to decline in 2005 or 2006. They are likely to be followed in 2006 or 2007 by India. In 2003 these five countries produced 9.2mn b/d.

It should be noted that because the volume being produced by countries in decline is by definition reducing, it is difficult to calculate with precision what percentage of total production would be in decline by a certain date. We can, however, say with some confidence that by 2007/2008 close to 40% of global production will be coming from countries where production is declining.

At this point sustaining production levels will become virtually impossible as the countries that still have expansion potential will have to expand unsustainably fast to offset depletion and meet demand growth. In fact rapid production expansion will accelerate depletion and tip an increasing number of of both Opec and non-Opec

producing countries into outright decline. Indications of this are not yet showing up clearly in the production data although countries that have had difficulty expanding production are likely candidates.

It is possible, even likely, that this effect (accelerated depletion leading to decline) could mean that by 2007/2008 rather more than 40% of the world's production will be coming from areas in decline.

In 2003 world oil production growth was 3.66% (BP Statistical Review 2004). However, if the countries in decline are separated from countries still expanding a different picture emerges. The 28% of global production in decline were reducing at an average rate of 4.9% but were more than offset by the 72% of production coming from countries where production was expanding.

In 2003 the 72% were, on average, expanding by 7.5%. As we now know, this was achieved in large measure by a dramatic reduction in the amount of spare capacity around the world. This process of using up spare capacity was effectively completed in 2004 which means that, going forward, virtually all incremental demand will have to be met by new incremental capacity.

If the analogy of a scales or a seesaw is used then in 2003 the tilt was clearly towards expansion. The question at issue is how rapidly does this situation move towards the one where overall production decline - 'Peak Oil' - is the likely outcome?

Simple arithmetic shows that if 40% of production is declining at 5%/year then the 60% still expanding production will have to grow by 3.33% just to offset the production lost by the 40% in decline.

If demand growth is 2% the 60% still expanding would have to produced a further increment of 3.33%. Thus to meet an apparently undemanding 2% growth in demand the countries with expansion potential would have to raise their production on average by 6.66%.

If, however, demand growth was running at 4%/year the countries with expansion potential would have to grow at an average of 9.9%. Examination of the production data shows that only around 12 countries have expanded at these sort of rates in recent years and only

about 6 countries have been able to sustain such rates for more than a year or two.

A complimentary analysis is to list all the larger upcoming oil production projects as these provide virtually all of the incremental supply. Analysing these shows that there are large numbers of projects coming starting up in the 2005, 2006 and 2007. However, after 2007 there are very few new projects. There is, however, an average 6-year gap between discovery and first oil in these larger projects. This means that any new projects that are to come into production by 2010/2011 would be known by now.

This approach can be viewed as reasonably reliable because stock exchange disclosure rules and companies need to reassure stockholders means that most companies actively publicise their future production projects. Similarly Opec producers are keen to reassure the world that they have the capacity to continue as reliable suppliers. We can therefore conclude with some confidence that most projects out to 2011 or even 2012 are known. It is already clear that the future projects production profile confirms the analysis based on production data in showing that after 2008 meeting likely demand will become difficult. However, any form of crash investment programme would be unlikely to deliver any significant increment in production before 2011/2012. Such programmes would undoubtedly raise development costs as both skilled manpower and field development construction capacity are constrained.

A possible conclusion is that 'Peak Oil' will be in 2008+/- 2 years with further analysis needed to establish the factors that would accelerate or delay it.

The strength of an analysis based on production data and future production projects is that the information and data is less contestable and easier to validate than reserves data but it is one that complements and confirms the view from the more complex reserves based analysis that 'Peak Oil' is just a few years away.