

Depletion now running at over 1mn b/d

This year's *BP Statistical Review of World Energy* once again provides a mine of information for those wishing to analyse the energy industries.

Chris Skrebowski has used this year's data to try to analyse the impact that declining production is having.

Last year *Petroleum Review* (August 2003) re-presented the BP production statistics, dividing them into producers in decline, Opec producers with growth potential and non-Opec producers with growing output. This year, the re-presentation of the latest (June 2004) BP statistics has been done as a continuum of producers from those with the largest declines to those with the largest gains. To damp out individual year bias the listing has been based on the average annual change in production over the last two years of data, ie the average of the 2001/2003 output changes. One- and three-year average changes are also listed in **Table 1** and it can be seen that decline/increase order changes only slightly depending on the period used.

Production declines for entire countries, as opposed to individual fields or regions, is a recent phenomenon. Until the 1990s the only countries in decline had been the US, which moved into continuous decline after 1985 (although peak production was actually in 1971), and Romania, that also peaked in 1985. By the late 1990s, however, the BP statistics were showing at least 10 significant producers in decline; 1999 added two more, as did 2000 and 2001.

The most dramatic change to be seen in the latest BP statistics is the way the 32 countries where production is still expanding are having to produce ever faster to make up for the 18 countries where decline is into at least its third year. Overall production growth in 2003 at 2.71mn b/d (3.66%) was one of the five largest annual volume increments seen since 1973. However unlike all the earlier production surges, countries with declining output were a significant

factor in 2003. Because the 18 countries in sustained decline 'lost' production of 1.14mn b/d (-4.91%) this meant those still expanding had to increase production by 3.82mn b/d (7.52%) in order to achieve an overall production growth of 2.71mn b/d (3.66%).

Apart from the 18 in clear decline it is too early to be confident about which other producers will join them. Denmark looks a likely candidate and China looks to be another, the Chinese Government having confirmed that the two largest producing regions – Daqing and Shengli – are now in decline.

The rapid fall in Iraqi production is clearly a special case. Similarly, the small decline in Nigerian production is exceptional, reflecting the impact of recent social and political strife.

Two countries that had appeared to be in decline – Syria and India – have recovered over recent years, but it is unclear if this is sustainable. Similarly, Egypt has almost stabilised production following a period of steady decline.

Venezuela presents a real enigma. The reserves are generally thought to be available but a sustained lack of investment and the more recent political problems mean Venezuelan production has actually been declining since 1998 – despite the start-up of the four heavy oil projects in the Orinoco tar belt.

It should also be noted that, in totalling volumes in decline, Nigeria and Iraq have been excluded from the calculations.

Impact of decline

Production from the 18 producers now in obvious decline actually peaked in 1997 at 24.7mn b/d and by 2003 their production had fallen to 22.1mn b/d.

All the signs are that the rate of decline among the countries is actually rising. Decline among the group had been running at over 0.5mn b/d in 1998/1999 but recovered in 1999/2000 to post a gain of over 100,000 b/d, which was largely because Australian and Norwegian production surged. Since 2000, however, decline appears to have steadily escalated, with group production falling by over 500,000 b/d in 2001, by over 400,000 b/d in 2002 and by a stunning 1.1mn b/d in 2003 (see **Table 1**).

Calculation of the annual average decline rate shows that in the 18 years since the US went into continuous decline (in 1985) it has been losing an average of 1.6%/y, which is probably the reason why people have generally been fairly relaxed about depletion, assuming it progresses slowly. This view may be misplaced as, for example, Indonesia, in its 12 years of decline, has averaged 2.6%/y but over the last few years this has accelerated to last year's 8.5%.

Although it is generally true that decline rates for predominantly offshore producers are faster than for land-based production, there are notable exceptions. In the period since peak, Oman's production has declined by over 7%/y, Australia's by 7.6%/y, Colombia's by 8.2%/y, and UK production by 5.6%/y. Among the smaller producers there is wide range of gains and losses, but care needs to be taken as the performance of a single field can have a disproportionate impact.

Comparing average annual percentage changes over one, two and three years clearly indicates that, for the majority of the producers in decline, the rate of decline is increasing. The most dramatic example is Gabon, where, averaged over the last three years, decline is running at over 8%/y – but over the last year by over 18%. This and the other data tends to undermine the widely held view that decline rates tend to slow as depletion progresses.

Sustained large-scale production decline by an increasing numbers of countries means that the burden on countries with expansion potential increases, as the volumes lost to depletion have to be made up before any incremental demand can be met.

Peak production

For global oil production to move into decline – in other words to ‘peak’ – all that is required is for the volume lost in the declining countries to exceed the gains made in countries where production is still expanding. As the figures show it will be some time before this occurs.

In 2003 decline was running at a little over 1mn b/d and production gains at just under 4mn b/d. Last year can, however, be regarded as exceptional, with notably large output increases (over 10%) seen from a number of major producers – Iran, UAE, Qatar, Kuwait, Saudi Arabia, Algeria and Russia. It seems unlikely that such large increases can be repeated or sustained without massive new investment.

Production gains

Over the last two years no less than 15 countries have recorded production increases of over 5%/y; eight of these have sustained gains of over 10%/y. Amongst this group, where production is expanding fastest, the most important is undoubtedly Russia, where production has expanded rapidly since 1999 and is set to top 9mn b/d this year (2004). The other large sustained expanders are Brazil, Algeria, Angola and Kazakhstan. Sudan and Equatorial Guinea have been growing notably fast, but from low bases, and have not yet attained the status of major producers.

Five Middle East producers expanded very fast in 2003. This, however, came after an extended period in which their production levels were little changed. With little or no spare capacity now available around the world, production expansion will be closely linked to new project start-ups. (See table of megaprojects, pXX.)

Analysis of this year’s oil production statistics leads to the conclusion that declining production and depletion is now a significant influence and that rapid production increases are sustainable in only a limited number of countries. This, in turn, gives a very great deal of political and financial leverage to those countries that do have expansion potential. As **Table 1** shows, total North American production peaked in 1997 while Asia-Pacific production peaked in 2000 and OECD production in 1998. Latin American production may have peaked in 2002, although it is too early to be sure.

What this year’s BP statistics confirm is that, if the world is to get the oil production it is likely to require, a great deal of additional investment will have to take place. ●