



## Oil depletions are not created equal

Posted by [Heading Out](#) on August 3, 2005 - 5:52am

The comments, at Ianqui's post re Senator Schumer, led me to [Econbrowser's](#) discussion in the Wall Street Journal Online. In it he makes the comment

I think one such externality is related to the geographic location of the remaining world's reserves. As the U.S. and North Sea reserves get depleted, the world is increasingly reliant on places like Saudi Arabia, Iran, and Venezuela, whose governments are actively using the oil revenues they receive from us in ways that are very fundamentally contrary to the interests of most OECD nations....

. The problem with discussing historical truths in today's world, is that they are changing. One can no longer, for example, say that it is a wasted effort to [take coals to Newcastle](#). Similarly the historic reliance on fuel from Iran and Venezuela is going to change as their oil supplies deplete, in [Iran's case](#) at 400,000 bd per year, little better than the 500,000 bd depletion occurring in the North Sea. And in [Venezuela's case](#), they are now about 1 mbd behind their OPEC quota, a drop of some 500,000 bd this year. Which also means that when we need them, they won't be there. Sorry, sir! (Though sometimes I get the feeling that arguing geology against economics is a bit like a discussion on evolution - but perish the thought!)

This brings the discussion back to depletion, on which I quoted [Skrebowski](#), who used an average depletion rate of 5%, with other sources using 7% for a well in depletion.

These are averages used until now to estimate how long fields will last, and how much new oil is needed to replace such losses in a market where supply exceeded demand. This average held up, where conventional methods of oil removal (primary recovery using vertical wells, then secondary and tertiary recovery) were used. However, there has been a recent change in the way oil was recovered, initially in the Middle East. Rather than get the oil out in a three-step process, as horizontal drilling came into favor, it was combined with the concurrent injection of water below the oil layer to maintain reservoir pressure and more rapidly recover the oil. (For a sectional view of such a field in late development see [here](#), and for a greater discussion [here](#)).

The method was very successful and has been adopted in other countries, and in the North Sea, as a way of getting more oil out faster. But here is the rub, because of the success in producing the oil, when the field depletes it drops at a much faster rate. The first place where this was seriously realized was in the Yibal field in Oman, and the picture I repeat was initially posted by Jean Lahererre, who has studied this more than most. (For more on Yibal see [Green Car Congress](#)).

The results for Oman have been [significant](#)

The oldest independent state in the Arab world, Oman has an economy which, like those

of many of its neighbors, is heavily based on oil production. While recent high oil prices have driven state revenues well above predictions, production levels - currently at 750,000 barrels per day - have actually fallen considerably in recent years, dropping 8.9 percent between 2002 and 2003 alone.

And they are not alone, the production drop in the North Sea is now running [over 11% a year](#). This is of concern because the projections have been used as the basis for [British investment plans](#)

Current oil and gas investment is expected to hold the rate of production decline at 6-7%/year for 5 years. But challenges remain if the industry expects to slow the long-term decline rate, UKOOA said. The UK offshore oil and gas industry spent Â£4.7 billion in 2004 on operations and Â£3.7 billion on exploration and capital expenditure. During 2005, the industry expects to invest Â£5 billion on operations and more than Â£4 billion on exploration and capital developments.

During 2004, the number of new project approvals doubled from 2003 to 27 project approvals, and exploratory drilling increased 40% from the previous year with 63 wells drilled.

Thus if the deletion rates are greater than anticipate, then the gap between supply and demand will develop and grow that much faster than exists in Skebowski's comparison into the next five years.

There is also another worry that goes back to [Jean Lahererre's paper](#) at the Lisbon Conference run by ASPO this May. There are a couple of paragraphs in that paper that are of interest - the first is this:

SPE/WPC rules define "proven" value as being at least a probability of 90% to exist. I have shown already that the USDOE annual reports allow computing the probability of the proved estimates, which were for oil about 75% in the 70s, but trending towards 50% now, as in 2001 the negative revisions were larger than the positive revisions.

The rest of the world report proven + probable (Canada starting to do so in 2003) so now the technical values are close to the mean values, except in the OPEC countries where quotas are based on reserves which became political with the increase from 1985 to 1990 of 300 Gb by OPEC countries without any significant discoveries. In the past there was only one worldwide source of field reserves, being Petroconsultants funded by a geologist (bought by IHS in 1999). Now IHS, who bought recently CERA, has lost its geological background and uses more and more political data. A new competitor Wood Mackenzie (WM), which uses more economical and technical data than IHS, is completing its country database and can be compared. The difference is very large, higher worldwide than the undiscovered estimate. The difference varies with the countries as seen below.

And I quote it to point to CERA's ownership and the switch to political rather than geological numbers. The second paragraph discusses Saudi Arabia's reserves:

To increase the country cumulative oil discoveries by 80 Gb form last year to this year,

IHS has increased the estimate of large fields by simply increasing the recovery factor. Ghawar last year IHS 60% was increased to 70% (from 122 Gb to 147 Gb), which seems difficult to get when knowing that the aquifer is inactive, but WM increase was from 108 Gb to 131 Gb. But Manifa field discovered in 1957 and which has been on production since 1965 and has produced only 0.3 Gb is now reported by IHS to have 23 Gb with 70 % RF (17 Gb last year with 52 %), but 4 Gb by WM. The difference between IHS and WM is given below. For the country IHS has increased from 314 Gb to 395 Gb, when WM has increased from 196 to 239 Gb

I have quoted these paragraphs to lead into one line from the table on current Saudi reserves that follows. It lists the major oilfields and their current estimate of reserves by the two sources described above, and in almost every case the IHS number for this year on recovery factors is significantly higher than the year before, There is only one field where the numbers go the other way - here is the line that reads

Abqaiq (discovered) 1940 (IHS reserve - 2005)19 Gb (IHS 2004) 22 Gb (Recovery factor 2005) 60% (Recovery factor 2004) 72% (WM 2005 reserve) 16 Gb (WM reserve 2004) 15 Gb.

And this is a lot of ink to make the point that Abqaiq is the largest field that, as it dies, is being recognised as being able to produce much less than estimated. And while this is conjectural, one would suspect that this is because they have accelerated the extraction of oil, and as Matt Simmons commented in "Twilight in the Desert" this has ultimately hammered overall recovery. The result is admitted because it is an ongoing event that is hard to deny and it is a likely precursor to a similar change in numbers for Ghawar and similar fields as they also enter their final years.

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