



Depletion and advanced extraction techniques

Posted by [Heading Out](#) on August 11, 2005 - 5:34am

(A guest post by J)

Ben Kenney has commented that he does not understand why Matt Simmons has said that there may be anywhere in the range from 28 to 30 mbd of oil coming out of the Middle East at the moment. Some of this relates to the difficulty in predicting how much oil will come out of Iraq in any given day, but there is another problem.

This relates to the problem of depletion that has been a theme of my recent posts. The Saudi's have admitted that they are seeing up to 1 mbd of loss a year now, and some of the numbers that come from the tanker side of the business suggest that they may be seeing some of this loss and its effect on immediate shipping. But J has tackled this from a more hands-on practical realism, and so I am glad to give this space to him to explain. He says things that we sometimes skate around. So here he is:

"Halfin, George and some others have been talking about production technology and revising Hubbert's curve to reflect the newer methods we use.

I think this is a valid exercise, but it needs to be pointed out that when horizontal, maximum contact wells are used, there is no depletion curve. Once the oil/water contact is passed and water cut (percentage of produced water) exceeds the economic limit, the well is toast. There is No, zero, none, nada further production to give a backside curve. You cannot put this type of well on stripper production. (Which is production where the residual oil is pumped out of the ground by a small donkey engine, typically).

The same holds true to a large extent for CO₂ injection - when injection costs exceed set profit margins, then there is no more injection, and the field is done. Again, no depleting curve on the backside, and you cannot put this type of field on stripper production.

I have pointed this out numerous times - that putting fields into stripper production allows oil to "hang together" continue to flow and collect around a well. At slow pump rates, production is even renewing itself in many fields. Stripper production is what Hubbert knew as the standard practice, along with steam and a few other options. This was probably one of the extraction techniques for late life production that would give the declines that he used as the basis for his curve.

The curve is based on a finite volume of oil being available from a field. Assuming that this volume can be fairly accurately estimated, and knowing that the total production that can be achieved from any field is, at a maximum, 75% of reserve estimates, then the curve is, with this process, a reasonable predictor. There is no technology out there, however, that can change this 75% average overall recovery rate. If anything, the 75% level is extremely optimistic for heavy oils, deepwater, and unconventional sources. (Ed. note Abqaiq is now estimated as likely to yield only 62%).

If you push the front side of the curve by increasing production volume, this will actually shorten the life-time (X-axis) of the curve, which brings the arrival of Peak Oil to an earlier rather than later date. If you make the curve taller by extracting the oil at a much faster rate and greater volumes to meet higher demands, then the end point gets closer to today. This is because the maximum volume at best stays the same, though the available volume may go down with these modern methods.

Since Hubbert assumed that the oil would be extracted by standard production methods, his curve is bell shaped. If you pop in a depletion rate of 30% (conservative based on what we are doing today), the back side of the curve will make professional skiers blanch - it will be very steep and abrupt. And this is exactly what the national oil companies are doing to stay afloat - they are ramping up production at the expense of total field volume!! The newer, higher production methods yield less total volume than the old methods.

You cannot have it both ways - you cannot increase production volumes and expect to increase total reserves. The converse is actually true due to the nature of oil deposits and production. If you produce it faster, you give up maximizing volume, and thus produce less than Hubbert used in his calculations. We use these types of calculation to determine if a field is even worth increasing production volume, or if it is better to leave it alone.

I don't have time (end of quarter crunch and whatnot) to address each production methodology, but these are things we know and work with everyday.

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