

Peak oil - coming soon but when?¹

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The idea that someday we are going to "run out of oil" is an old one. In fact, it goes back to the beginning of the 20th Century. However, it is a mistaken idea.

A reservoir of crude oil is never "pumped dry". Instead at some point, the extraction of hydrocarbons from a well is stopped and the well capped, because it is no longer economic to keep producing from it. At this point, most of the oil which the reservoir once contained is usually still in the ground. The same applies to natural gas and to reservoirs which contain both gas and oil.

Nevertheless, this mistaken idea has its roots in a geological reality. Oil production from any well, reservoir or field of multiple reservoirs will increase from an initial volume, eventually peak and then decline irreversibly to its "capping point". The decline may start immediately or some years later, after production has "plateaued" for a while.

When plotted on a graph, every production curve resembles a hill. The precise shape of the hill is largely determined by economics, the rocks which contain the oil and the history of its extraction. But it is always a hill. Once you pass the peak, you cannot reverse the decline for very long, if at all. If you want more oil, you will just have to drill another well, preferably in another reservoir some place else.

So when we say that world crude-oil production is going to peak, we do not mean that one day there will be no oil left in the ground, or that all the wells are going to be capped on the same day. We mean that at some point, the oil which is economic to extract (by whatever means) will reach its all-time high, and that sooner rather than later, there will be less and less of it produced each year thereafter.

So the more important question is not how much oil is down below, but how fast one can get it out. If you try to accelerate the extraction process too much, because near money is worth more than far money, you run the risk of reducing the amount of oil and/or gas which can be extracted over the remaining life of the well or reservoir. The foregoing is not a theory. It is economics, engineering and geology all entwined together.

From a theoretical debate to an alarm about actual reserves

The optimum pattern of extraction for any well or reservoir depends primarily on certain factors, such as the size of the initial find, the rate of extraction over time, the characteristics of the rocks in which the reservoir is located and, of course, the economics of further extraction. So many professionals have attempted to model this pattern mathematically.

One of the most famous models was M. King Hubbert's version of the logistic curve, by which he correctly predicted the peak and decline of US crude production. In fact, most of the debates over "peak oil" in the 20th Century revolved around what are, for lay people, arcane issues of modeling. So in that sense, and that sense only, the 20th Century debates may be characterized as "theoretical" in part.

However, the debate which has begun in the 21st Century is different. It is not theoretical. It is not even about forecasting techniques. It got started because people began to question the veracity of Saudi Arabian oil statistics and the accuracy of that country's projections of its future production. This is the story.

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For some five decades, Saudi Arabia managed to make the world believe that it was a cornucopia of oil. It also managed to convince people that it had some "aces up its sleeve", in the form of geologically promising rock formations which had not been drilled. The writer remembers this very clearly, beginning in his refinery days, in the late 1960's.

Indeed up to a few years ago, Saudi oil executives were still claiming that the country would produce 10, 15 or even 25 million barrels per day of crude oil for the next 50 years! This was despite the fact that it had never produced much more than 10 million and is currently producing less than eight million. All of these allegations were of course very convenient because (a) they got the world "hooked" on cheap oil and (b) they assured the country of US military protection against hostile neighbors, who were stronger militarily and, in some cases, more populous (Iraq, Iran and Israel).

However, all of these assertions have turned out to be somewhat optimistic. Most of the reservoirs which are still active today "show their age", especially those which have been producing for 50 years or more, and some even began to do so decades ago. Last but not least, the unexplored or underdeveloped reservoirs appear to be only "jacks" or "tens", instead of "aces". Only the outside world didn't know any of this until recently.

The first person to "blow the whistle" was Dr. Sadad al Hussein, head of exploration and production for Saudi Aramco, the government oil company. In 2004, he wrote a memorandum to the Minister of Oil. Following a dead silence (at least as far as the public was concerned), Dr. Hussein retired.

However, Matthew Simmons, an American banker with 35 years of oil-industry experience, picked up the thread. Among other documents, he studied nearly 300 Saudi technical presentations given at international conferences with the approval of Saudi Aramco. He concluded that Hussein was right and wrote the now famous book, "[Twilight in the Desert](#)" (2005) which sets forth his findings. This book does not confirm the Saudi joke, "camel herders to camel herders in three generations", but still it tells a pretty somber story.

Needless to say, lots of people heard or read each and every one of these presentations but very few heard or read more than a few. So most people were not aware of the story which these documents told, when organized by reservoir and set end to end by date.

This book set off an international debate with various consequences. First of all, the Saudis are now talking about a peak in their production of 12 million barrels, to be followed by a "plateau" of 10 million barrels and then a decline. The plateau is expected to last no more than a decade. All of which begs the question: When Saudi production peaks, can a world peak be far behind?

Secondly, the King of that country reserved all future discoveries "for our grandchildren", instead of allowing them to be exploited immediately, to satisfy the world's insatiable appetite for crude oil. Thirdly, everybody began to make projections of the year in which world crude-oil production would peak.

In October 2008, the UK Industry Taskforce on Peak Oil and Energy Security (ITPOES) even [warned](#) that a peak in cheap, easily available oil production is likely to hit by 2013, posing a grave risk to the UK and world economy.

A wide spectrum of views

Unfortunately these projections vary "all over the map". For example, "the optimists" like ExxonMobil, who want to keep us hooked on oil until the last possible moment, say 2030 or 2032.

"The pessimists" claim that the peak has already occurred, say in 2004. More important, however, the International Energy Agency, once a leading optimist, has just "thrown in the towel" and gone for 2020. Elsewhere, a consensus seems to be building around 2010-2013.

In part, the reason for these disagreements is this. It is hard to project future economic conditions and future technological breakthroughs. What kind of technologies will we have at our disposal, what will be their fruits and what will they cost, ten years from now? What will be the price of crude oil from a given location? So how much crude oil will it be "economic" to extract at that point?

But the biggest problem is that industry statistics are full of errors, omissions and bald-faced lies. This is especially true for estimates of "reserves", that is for estimates of the oil which remains to be extracted from active reservoirs and promising prospects. For example, the official reserves of one major producer are reliably believed to be overstated by 111%, according to a respected industry publication.

Even if industry statistics were accurate (which they are not) they would still be exaggerated. Neither production nor reserve statistics deduct the equivalent in crude oil of the energy required to put a marketable liquid in a tank on the surface. This can vary from 15% for an old reservoir which requires heavy water injection to 45% for a worst-case tar sands formation.

Meanwhile most compilers of statistics for the industry continue to publish inaccurate data (so as not to offend their sources) and to even ridicule the very concept of peak oil as a mere "theory".

Our guess

Under the circumstances and in the writer's professional judgment, the best we can say is the following:

There is a 90% chance that world crude-oil production will reach an all-time peak by or before 2020. There is at least a 60% chance that the subsequent decline will be steep rather than shallow, whether or not a plateau follows the peak. A steep decline is expected to bring on a worldwide depression and, possibly, regional wars over sources of energy.

Needless to say, if you are a long-term or strategic planner, 2020 is "just around the corner".

Unfortunately many of the decision makers who still occupy important positions in business and government are either "ostriches", "friends of petroleum" or both and don't take any of the above very seriously.

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