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Comment

Peaking of World Oil Production: Is the Wolf Near?

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In 1874, the state geologist of Pennsylvania — then the nation's leading oil-producing state — estimated that only enough U.S. oil remained to keep the nation's kerosene lamps burning for four more years. Nearly 50 years later, during World War I, the federal government concluded that depleting U.S. oil supplies required reliance on oil-shale resources. In 1952, the Paley Commission estimated that by the 1970s, the United States would have to shift its reliance from oil to coal and synthetic fuels. And during the energy crises of the 1970s, many pessimistic studies predicted imminent, permanent oil shortages and oil prices of $100 per barrel in 1980 dollars ($208 per barrel in 2004 dollars). By 1999, however, the price of oil was around $15 a barrel (2004 dollars).

Because oil is a finite resource, the world has been "running out" of oil since the first barrel was extracted, and oil supply eventually will not be capable of satisfying rising world demand at prevailing prices. Thus, the peaking of world oil production has been a matter of speculation from the very beginning of the modern oil era in the mid-1800s, and for 150 years, energy experts and analysts have been claiming that the world peak would occur in the next 25 years or fewer.

No one knows, however, precisely when the peak will occur. A unique and frustrating aspect of the world oil peak problem is that its timing is uncertain in large part due to inadequate and potentially biased reserves data from around the world.

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Reserves are an estimate of the amount of oil in a reservoir that can be extracted at an assumed cost. Thus, a higher oil-price outlook often means that more oil will be produced, and the reserves will increase. But geology also limits reserves growth. In well-managed oil fields, the maximum increase in reserves is usually only 10 to 20 percent, no matter how high the price. Reserves estimates are revised periodically as new information becomes available from the developed fields, but reserves estimation is hampered by the inherently limited information we can obtain about complex rock formations located miles below the surface. Sometimes large errors occur, as was the case with Shell's recent reserves markdown of more than 20 percent (see *Geotimes*, March 2004).

With publicly available data on reserves sometimes grossly unreliable, estimating the amount of available oil becomes a complex technical, political and institutional problem. For example, when OPEC decided during the 1980s to base its quotas, in part, on oil reserves instead of production, a number of its members immediately doubled or tripled their reserves estimates. In Iraq, reserves reports of 100 billion barrels came out every year from 1985 to 1998, despite no major new discoveries while the country continued to produce oil. And most Middle Eastern reserves estimates have not been subject to outside, independent verification since the 1970s because the countries will not permit it. In Canada in 2002, unconventional oil from oil sands was added to their conventional oil reserves, resulting in a huge increase in reported reserves.

Given these uncertainties and the long history of failed forecasts, the salient question becomes: What convinces us that current foresight and recent predictions will be accurate? Fortunately, for a number of reasons, the quality of the evidence has improved considerably.

Extensive drilling for oil and gas has provided a massive worldwide database, and current geological knowledge is much more extensive than in years past. Also, various seismic and other exploration technologies have advanced dramatically in recent decades, greatly improving our ability to discover new oil reservoirs. Nevertheless, the number of oil reserves discovered per exploratory well has been declining worldwide for more than a decade.

We are finding less and less oil in spite of vigorous efforts, suggesting that nature may not have much more to provide. As such, many credible analysts have recently become much more pessimistic about the possibility of finding the huge new reserves needed to meet growing world demand. Even optimistic forecasts suggest that the world oil peak will occur in less than 20 years.

The major oil companies are also becoming more obviously guarded. In September 2003, the president of ExxonMobil Exploration Company indicated that it would soon be very difficult for oil-production levels to keep up with demand, and in February 2005, the president of ChevronTexaco (now Chevron) stated that the world faces an “inflection point” and is entering a permanent period of oil and natural gas shortages.

When talking about oil peaking, however, it is important to remember that it is a liquid-fuels problem for the transportation sector, not an “energy crisis” in the sense that the term has been often used. Many motor vehicles, aircraft, trains and ships simply have no ready alternative to liquid fuels. Frequently publicized energy alternatives, such as solar, wind, photovoltaics, nuclear power, geothermal, fusion and others, do not produce liquid fuels, so they cannot affect transportation until major technology shifts are implemented on a significant scale.

Contrary to a recent spate of doomsday books, the peak of conventional world oil production will not result in the end of modern civilization. Nevertheless, a worldwide

peak in the current energy and economic environment could create disruption on a scale much greater than that experienced during the 1973 oil embargo or the 1979 Iranian oil cutoff. Still unknown are how to address the challenges posed by an oil peak and when the peak will actually occur. We believe, however, that it is wise to focus on prudent risk management, potential solutions and mitigation strategies instead of being consumed with arguing about the exact date of conventional oil production peaking.

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