

Peak Oil and Aboveground Risks

by David Cohen

It sounds paradoxical, but the notion that we could have shortages of oil when there really is no shortage of oil is being discussed at various industry forums. At the SPE/IADC Drilling Conference and Exhibition held recently in Amsterdam, sponsored by the Society of Petroleum Engineers and the International Association of Drilling Contractors, a panel addressed the question of whether future oil and gas reserves are "out of our reach." The panel concluded that "a shortage of resources" was the least of the problems faced by the exploration and production (E&P) industry. Rather, the "larger risks" were above the ground, not beneath it. Earlier in February, on the eve of the CERA Week 2007 conference in Houston, IHS Energy and Cambridge Energy Research Associates (IHS/CERA) broached the subject from a different angle when it introduced the upstream capital costs index (UCCI), a tracking mechanism to assess escalating project costs. Spiraling costs, like lack of access, can create shortages in a context of abundance.

Many industry representatives and analysts consistently maintain that peak oil is not a concern. They frame a peak or plateau in global oil production as a geological argument and then dismiss it, portraying the fossil-fuels resource base as vast. They argue instead that the future oil supply is threatened by aboveground problems that include:

- soaring E&P costs, arising partly from shortages of equipment and trained personnel
- an ever-increasing need for new technology, with rapid adoption, to develop difficult-to-produce reservoirs
- restricted access for international oil companies (IOCs) or unfavorable fiscal terms for these operators
- the growing power of national oil companies (NOCs), including new competition with Asian NOCs

Concerns about a peak and subsequent decline in world oil production revolve around the conversion rate of reserves into flows. It is a matter of how quickly operators can lift oil out of the ground to counter an annual decline rate of about 5 percent in existing production and meet rising demand, accompanied by fears that there is currently little price elasticity in that demand. Consequently, any factor that postpones increased global oil production poses the Red Queen problem, as expressed in Lewis Carroll's *Through the Looking Glass*: One must run faster and faster merely to stay in place. If aboveground problems make targeted supply increases harder to achieve, the peak of world oil production draws nearer as production eventually fails to match geologically determined declines.

Cost and Technology Woes

"The key word is urgency," the executive director of the International Energy Agency (IEA), Claude Mandil, said at a news conference in November 2006 where he announced the new edition of the *World Energy Outlook 2006* (WEO 2006). If current trends continue, Mandil told the assembled

reporters, "this energy future is not only unsustainable, but it is doomed to failure." He cited the first two aboveground problems on the list: soaring costs and the need for technology. As for costs, the WEO 2006 report "identifies under-investment in new energy supply as a real risk." Although investment reached \$340 billion in 2005, an increase of 70 percent since 2000, the IEA calculated that the real inflation-adjusted increase was only 5 percent, due to rising materials, equipment and labor costs.

CERA's UCCI index underscores the IEA's concerns. Their data indicate that, overall, costs have increased an astonishing 53 percent in the last two years, with a 13 percent rise in the last six months ending in October 2006. Deepwater projects led the way, climbing 15 percent in that six-month period. The largest cost drivers were offshore rig rates, lack of offshore installation vessels and shortages of skilled labor. Capacity expansion requires significant capital investment and further depends on the oil price staying above \$55 per barrel, according to CERA. Even if these conditions are met, no easing of market tightness will happen until 2009. The world can ill afford delays in upstream deepwater projects because of equipment shortages within the oil industry itself.

Deepwater projects have a relatively short lifetime. Economics and engineering dictate that these fields reach peak production quickly; thereafter, a rapid falloff in flow rates ensues. To maintain production levels, new fields must be added, usually in ever-deeper water. The move to ultra-deep water brings associated technology risks. Phase 8 (2006-2007) of the Deepstar project, for example, seeks to develop the technologies necessary to support floating production in the deeper basins out to water depths of 10,000 feet.

Shell currently plans to use a direct vertical access (DVA) spar moored in about 8,000 feet of water to produce the Great White, Tobago and Silvertip fields located in the Perdido Foldbelt of the Gulf of Mexico. However, it is possible that specialized technology requirements for producing ultra-deepwater oil will lead to another round of industry challenges in the future. Pioneers must cope with the problems that come with doing things for the first time. Technology and design difficulties have already led to cost inflation and delays at BP's Thunderhorse in about 6,000 feet of water, where production is stalled by cracks in subsea manifolds.

IOCs versus NOCs

The world is witnessing the acceleration of an historical shift that really began with the formation of the Organization of the Petroleum Exporting Countries in 1960. Over the decades since, the demand for oil has inexorably risen, with the exception of the drop that followed upon the oil shocks of the 1970s and early 1980s. Producing countries, which began excluding IOCs in the 1970s, are asserting even more exclusive

control over their own resources through their state-run national oil companies. The scramble to control reserves has been further aggravated by increased global activity by the NOCs of China and India, which seek to secure supplies to meet rising demand in Asia.

As the historical shift continues, IOCs have experienced greater competition, restricted access to reserves and less favorable fiscal terms from the countries in which they operate. Figure 1 shows the access situation as determined by the IEA.

The situation of the IOCs is complicated because in each producing country, access is governed by politics and entails increased operating costs, including taxes, royalties and profit sharing. In more extreme cases, such as with Venezuela and Russia, access to reserves is being denied altogether where it had previously been granted. The position of the IOCs was expressed by Chevron's head of international E&P, John Watson, at CERA Week: "The truth is we could still run short of oil above ground, where access and politics come into play."

The bottom line is that geopolitical aboveground factors are indeed a "peak oil" issue. Although states are subject to internal revenue pressures, they tend to use lower discount rates than IOCs would in bringing oil to market. What this means, in effect, is that NOCs such as the Kuwait Oil Company may not produce their oil with the same profit-driven alacrity that ExxonMobil would. Nations and the politicians that run them, if they are wise, seek to maximize revenue streams over many years. Barring corruption, as seen in places like Nigeria, states are responsible for their citizens' welfare, not beholden to shareholders looking for healthy quarterly profit statements. The situation is further complicated by a lack of technology adoption and sharing in cases where access to challenging reserves is limited.

Over the long haul, the IOCs will either get used to the new realities, diversify or go out of business. IOCs will have to settle for a contractor's role in the development of reserves they do not own, with a concomitant drop in the revenue share. On the other hand, NOCs (and their state owners) will need to see the benefits of employing the expertise the IOCs bring to new upstream development. Nevertheless, geopolitics will often interfere with such arrangements, however they are expressed in fiscal terms.

Uncertainty about the Oil Price

For both IOCs and NOCs, soaring capital expenditure costs and constant dependence on incremental technology improvements make the future oil price ever more critical to bringing new supply to market. Price may be the single most important aboveground factor. Without a guaranteed high price, there is simply too much risk in finding and producing challenging new reserves, whether development is onshore or in deeper water offshore. Reserves may not be unreachable, as the SPE/

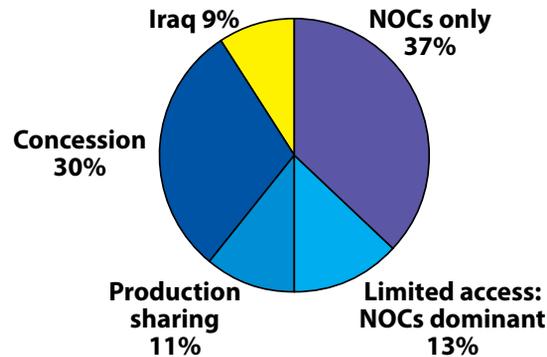


Figure 1: Access to world proven oil reserves, end of 2005

IADC conference panel concluded, but the easy oil is now gone. The Kashagan field completion in Kazakhstan is now experiencing yet another delay; the Italian oil company Eni has announced that the first oil, amounting to 300,000 barrels per day (bpd), will flow in early 2011. Capital cost estimates are now in the \$19 billion range, about 45 percent over the original estimate of \$10.3 billion.

Oil price volatility is the greatest threat. Since 2002, there has been little spare oil-production capacity. This market condition has been accompanied by rising prices, presumably reflecting supply-and-demand fundamentals. However, the price line shows large fluctuations, the most recent of which was the nosedive from a high of \$75 per barrel in the summer of 2006 to a price of just above \$50 per barrel in January 2007. Given the huge investment cost and technical risks for new projects, the oil price signal must remain consistently high if the world hopes to meet rising oil demand, especially from Asia.

According to the IEA's chief economist, Fatih Birol, the spare-capacity situation is not going to change much. Commenting on the WEO 2006, Birol said that even if all envisioned projects "see the light of day," the world's production capacity would add only 1.3 million bpd above projected demand levels by 2010. Needless to say, not all projects will arrive on time, and some may be further delayed or cancelled if the oil price falls below \$55 per barrel for any significant length of time.

The distinction made between the geological considerations affecting the future oil supply, on the one hand, and the aboveground factors often cited by the oil industry on the other, is spurious. These are two sides of the same coin. Should an irreversible peak in world oil production become evident before 2015, contrary to optimistic estimates made by CERA and ExxonMobil, it will not matter what the reasons were, or who was right and who was wrong. ♦

After a career in theoretical linguistics and software engineering, David Cohen turned to investigating climate change and energy issues. A senior contributor at The Oil Drum, Mr. Cohen focuses on oil depletion, natural gas supplying North America and alternative energy futures.