

## **A producer's perspective on the oil industry**

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This paper will address three main subjects: 1) the volumes and reliability of the Saudi Aramco's oil reserves and production capability, 2) some critical technical limitations that characterize the global oil industry as a whole, and 3) the likelihood of an oil crisis evolving as a result of such limitations and current geopolitical realities.

First what is an oil crisis? My definition is "a sustained oil supply shortfall that results in enduring dire consequences to the global economy". The indications that such a crisis is now unfolding are compelling even though this has little to do with Saudi Arabia.

In fact one of the objectives of this paper is to set the record straight. Saudi Arabia's reserves and production capability are reliable and accurate. Saudi Arabia has lived up to all its production capability commitments vis a vis the industry for many years, and continues to do so under the most adverse operating conditions.

With regards to its oil reserves, Saudi Aramco wrote the book and chapter over twenty five years ago for the operating philosophy which became known as "first class oil field practices". Its methods and parameters are state of art technologies tailored to fit the specific needs and conditions of giant oil accumulations. Many of these practices were developed with the help of our friends in ExxonMobil, ChevronTexaco, Schlumberger and other leading centers of expertise. Many have yet to be applied in an integrated manner by other NOCs or even some of the IOCs. Even the economics behind Saudi Aramco's reserves are conservative and exclude allowances for EOR processes or real escalations in future oil prices.

Let's look at the rest of the facts. The proven Saudi Aramco reserves were 260 billion barrels as of year end 2003. This represents 37% of its proven original oil-in-place (OOIP). These reserves conform with the requirements set down by the Society of Petroleum Engineers (SPE), World Petroleum Congress (WPC), and the American Association of Petroleum Geologists (AAPG).

Saudi Aramco has already reached recoveries that exceed 75% of proven reserves and 40 or 50% of original-oil-in-place, in some of its oldest oil fields. Its overall reserves depletion stands at only 28% of original proven reserves. Even its oldest and most mature fields, such as Abqaiq and Berri, are still producing at a combined plateau of almost a million barrels of oil a day.

To the extent that additional reserves are proven and confirmed, or to the extent that real energy prices are escalated, the Saudi oil production plateaus can be extended accordingly. Based on these realities, Saudi Aramco's oil reserves and production capabilities are not a problem.

The industry's true problem is the runaway thirst for energy supplies at unrealistic expectations of cost and availability. The International Energy Outlook of the EIA is an example of such unrealistic expectations. Its long term oil price outlook of \$24 to \$27/barrel is already out of touch with realities. Even its high price scenario of \$ 33 to 35 /barrel has been superseded by events. Its assumption that non-OPEC can increase its supplies by 38% to almost 65 mmbd and OPEC almost double its production to 56 mmbd by 2025 flies in the face of technical realities. In fact such speculative and unrealistic expectations are an obstacle to an international energy dialogue and only confuse the best of well intentioned policy makers.

The first global reality that will impede such optimistic outlooks is the cost of integrated oil and gas production facilities. Ever since the end of gas flaring, large oil developments, particularly developments in major new basins, have required a full spectrum of gas processing and shipping facilities. In the Arabian Gulf, the capital cost of gas facilities for gas gathering, sweetening and NGL recovery can add \$1000 to \$ 2000 per 1000 cubic feet of inlet gas. It is doubtful that any country with a major oil production strategy, however remote it may be, will allow future oil developments without a sound disposition for the associated gas and gas liquids.

Beyond this, there is the issue of declining reservoir capabilities as a function of reserves depletion. The faster the rate of depletion of existing reservoirs, the more severe their decline in production capability. This capability must then be replaced on a continuous basis. Assuming an annual global decline of 3 - 5% in reservoir capability and an annual increase in oil demand of 2%, the new oil production required annually would be 5 - 7% rather than the 2% often assumed by many economists. Therefore in order to meet the EIA's increase in global demand from 82 mmbd in 2005 to 120.6 mmbd in 2025, 97.6 mmbd of total new capacity are required. This is well beyond the EIA's 38.6 mmbd based on a 2% increase alone.

Finally, there is the issue of proven reserves ready for exploitation. At the rate of consumption predicted by the EIA, over 700 billion barrels of oil reserves will be consumed within the next two decades. The EIA and USGS do not see this as an impediment because they estimate global oil reserves and resources to total almost 3 trillion barrels of oil. This is the sum of proved reserves, reserves growth based on proven accumulations, and "yet to be discovered" accumulations.

The EIA and USGS estimates are in fact optimistic and strongly contested by many industry analysts. The reported proved number of 1,266 billion barrels includes reserves of uneven technical and commercial quality. For example

they include almost 170 billion barrels of Canadian bituminous crudes which are less commercial or logistically accessible than the conventional crudes they are intended to supplement.

The "growth in reserves" of 730 billion barrels is based on a past record of increases associated with new discoveries. Since the rate of new discoveries has been dropping, the estimate of reserves growth is also optimistic.

Finally, the predicted new discoveries totaling 939 billion barrels call for a discovery rate of approximately 38 billion barrels of proven reserves per year. In fact actual discoveries have been declining and have averaged below 10 billion barrels per year in the last decade. Unless exploration opportunities expand significantly, achieving substantial new discoveries is an unlikely proposition.

Based on these realities, the following conclusions are inevitable:

- The Kingdom of Saudi Arabia's oil reserves and production capability are firm and conform to the applicable industry standards.
- The cost of new oil capacity throughout the world is often underestimated in energy studies.
- Oil price and volume projections by organizations such as the EIA form the basis for many national policies and must be made realistic if they are to be relevant.
- The combined effect of all these technical limitations can only mean that oil price increases are inevitable. Whether these increases are gradual or abrupt will depend on geopolitical events and the collective wisdom of the global leadership.