

MIDDLE EAST OIL - REALITY AND ILLUSION

by
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Throughout history, people have had difficulty in distinguishing reality from illusion. Reality is what happens, whereas illusion is what we would like to happen. Wishful thinking is a well-worn expression. Momentum is still another element: we tend to assume that things keep moving the same direction.

The World now faces a discontinuity of historic proportions, as Nature shows her hand by imposing a new energy reality. There are vested interests on all sides hoping somehow to evade the iron grip of oil depletion, or at least to put it off until after the next election or until they can develop some strategy for their personal or corporate survival. As the moment of truth approaches, so does the heat, the deceptions, the half-truth and the flat lies.

There are enormous geopolitical stakes. As is well known, oil production in the onshore United States has been in decline for over thirty years despite every effort and incentive. Its gas supply too is on the brink of collapse as the in-built spare capacity, which supported plateau-production, runs out. Its dependency on oil imports has passed 60%, and is set to rise even higher unless recession cuts demand. A year ago, it invaded a Middle East country, which was thought to have substantial oil reserves, on pretexts since found to be invalid. It has also built up a monumental level of foreign debt, backed by paper collateral built on the assumption of perpetual economic growth.

Now at last, the financial community begins to wake up to the impending decline of oil from natural depletion. It is a devastating realisation for which there is no ready solution. Given the central role of oil in the world economy, a shortfall in supply can only spell serious and lasting economic recession. Every day, oil prices touch new ceilings. The traders, with negligible knowledge of the resource base itself, wait in vain for the next cyclic downturn, asking what has happened to the spare capacity that they were led to believe was there in case of need.

The image-makers counter this dreadful reality with pictures of crazed Muslim fanatics bent on terrorism. They try to conjure up fears of Middle East countries holding the world to ransom by restricting essential oil supply, implicitly assuming they have it to supply. It has always been good politics for governments to invent enemies so as to deflect blame for failed policies from their own shoulders. Mrs Thatcher's finest hour was when she defended a small island in the South Atlantic from attack.

First, the US Geological Survey laid the foundations for the imagery with a study of the world's geological basins, giving the impression that there was plenty of oil left to find. The mechanism was a cloak of statistical probability. Who can dispute findings that a particular place might have a 95% chance of having more than one barrel and a 5% chance of more than 112 billion – by all means a wide range. The very notion of a unique geological basin having more than a 5% chance of anything stretches the resolution of the human mind. That is difficult enough but what credence can be attributed to the statistical Mean value derived from such wide range that speaks of great uncertainty. By all means, the Mean value was correctly computed, being even quoted to three decimal places, but does it have any relevance to the real world, facing the need to put physical oil in the tank? Further, the study suggested that the world's oil fields might be between 20% and 120% larger than reported. Pigs might fly.

In short, here was an image of plenty, provided by an apparently impeccable source, allowing others to develop forecasts of future supply, which the US Geological Survey itself wisely did not offer. One such entity is the Energy Information Agency (EIA), an arm of the US Department of Energy. It claims that Saudi Arabia's production can more than double over the next two decades, rising from 10.5 Mb/d to-day to 22 Mb/d by 2025, while Iraq's can rise from 2.5 Mb/d to 6.6 Mb/d over the same period. OPEC's total supply is accordingly

forecast to rise from 27 Mb/d to 56 Mb/d. World demand is depicted as growing from 81 Mb/d in 2004 to 121 Mb/d, implying a return to economic prosperity.

In other words, it is a picture of a cloudless sky save only for that lurking Muslim fanatic on the horizon. With such a rosy prospect before us, are we not therefore fully entitled to prevent, if necessary by pre-emptive strikes, any risk that someone might for example blow up the oil terminal at Ras Tanura in Arabia. Would it not be wise to use the bridgehead of Iraq to take control of the Saudi oilfields, depicting it as a constructive gesture for benefit of that country and its trusty rulers? And besides, would that not further strengthen Israel, by all means a client of the United States, in its struggle against the self-same fanatical Muslims, who curiously resent being expropriated.

We live in a world of imagery, delivered continuously by the television screen with its well-crafted juxtapositions and selected commentary. Scenes of mobs in dusty towns fluctuate with well-armed soldiers in flak jackets to the backdrop of automatic fire and explosions. Acts of heroism against a treacherous enemy become the daily diet of the masses, omitting reference to the grieving relatives of the 20 000 people who lost their lives in the original attack. Occasionally, the words of a mysterious robed figure, reported to be hiding in Afghanistan, are released to add a sinister overtone and strengthen our resolve against the imputed enemy.

The first clouds to interfere with this magnificent panoply of illusion were headlines announcing that the mighty Shell Oil Company had downgraded its reserves by 20%. That was quickly depicted, not as a consequence of natural depletion, but as negligence, incompetence, if not criminal behaviour, by the responsible executives. A pension fund with a large shareholding moved to oust the Chairman. A new human enemy was discovered to deflect attention from the laws of Nature.

Such is the imagery, spin and political expediency under which we live. But if we did want to step behind it to rediscover reality, the first step might be to ask how much oil we use and how dependent upon it we are. The Oil and Gas Journal, a premier source of public information, estimates that we used almost 25 Gb (billion barrels) in 2003, whereas the EIA quotes 30 Gb, adding perhaps refinery gains and other categories, not measured by the Oil & Gas Journal. Evidently, we can't even agree on how much we use, although that should be as simple as reading the meter. Oil provides more than 90% of transport fuel, on which trade depends, and plays a critical role in agriculture, which means food. It matters.

The Oil & Gas Journal reports that about one-quarter of world supply in 2003 came from five countries bordering the Persian Gulf (Abu Dhabi, Iran, Iraq, Kuwait and Saudi Arabia). So clearly, these countries have a key role. That in turn poses the question of how much they can supply in the future, assuming either their goodwill or the extermination of the imputed enemies who live there. It is not an easy question to answer, partly because oil reserves are State secrets, being also used as a basis for OPEC production quota, on which State revenues and indirectly the well-being of the people, depend.

A certain amount of detective work is therefore called for to at least make an intelligent and logical analysis. The first step is to ask how much they have produced so far. The sum of past production as reported by the Oil & Gas Journal is 238 Gb, about one-quarter of the World's total. Exploration commenced in the early years of the last Century, yielding a series of extremely large fields. They are always easy to find, simply because they are so large, and come in first. The peak of discovery was in 1948, being dominated by the World's largest field, Ghawar, in Saudi Arabia, meaning that this field alone exerts an important influence on the region's total past and future production.

The field is reported to have produced about 62 Gb, which according to a graph presented by the Saudis at a recent meeting of the Institute of Petroleum, represents about 43% of the oil-in-place, namely 144 Gb. The private oil companies, which operated the field until nationalised in 1979, reported that it held about 80 Gb, implying a relatively high recovery factor of 55%. If so, the field has about 18 Gb left. But if we look at the trends implied by the

Saudi graph, we can conclude that the field will have produced about 80 Gb by 2010 by which time almost 80% of the production will be water. The new technology may also add a few more years of tail end productive life.

In geological terms, the field is formed by a gentle anticline, about 200 km long, in which organic-rich Jurassic limestones form both reservoir and source, being capped in places by a seal of anhydrite. The structure is in fact broken up into about ten compartments that might have been individual fields had the oil charge been less massive. It is cut by faults and fractures, which at first facilitated the movement of oil towards the wells, but later formed conduits for the unwelcome entry of water from a massive water injection programme. That was needed because a tar deposit at the oil-water contact has blocked the natural water drive on the east flank. The field now produces 60% water, rising at 3% a year. New multi-branched horizontal wells are now being drilled with cutting edge technology to tap partly by-passed low-permeability oil zones in a desperate attempt to hold up production.

The other fields in the kingdom contain approximately 130 Gb according to estimates by the private companies prior to nationalisation. If so, the total discovered amounted to 210 Gb in 1989, at which point some 56 Gb had been produced according to the Oil & Gas Journal. It means that reserves then stood at 154 Gb. This was somewhat lower than the 170 Gb reported but the discrepancy could be explained by alternative recovery assumptions.

In 1985, Kuwait added 50% to its reported reserves although nothing particular had changed in the oilfield. Three years later, Venezuela doubled its reserves by the inclusion of long-known but not previously counted, heavy oil reserves. That forced Abu Dhabi, Dubai, Iran and Iraq to retaliate with massive increases to protect their OPEC quota, which was based partly on reserves. Saudi Arabia followed in 1990 increasing its reported reserves from 170 Gb to 257.5 Gb, an estimate that has barely changed since, despite intervening production of some 37 Gb.

There is obviously something wrong with these sums, but what? If the 210 Gb reported for Saudi Arabia by the private companies represented a recovery factor of, say, 40%, then the oil-in place would be 525 Gb. In that event, the 259.4 Gb now reported would represent a rounded 50%. It strongly suggests that Saudi Arabia is reporting total discovered, with an optimistic recovery factor, and not Remaining Reserves as commonly supposed.

It looks very much as if Kuwait is doing the same. Its largest field is Burgan, found in 1938, which was estimated by the private companies before nationalisation to hold some 60 Gb. The other smaller fields add up to some 30 Gb. The country had produced 22 Gb to 1984, when it reported reserves of 63.9 Gb, giving a total discovery of some 86 Gb, which is not far from 90 Gb it thereafter reported as reserves.

It may have made eminent good sense to base OPEC quota on total discovery, not remaining reserves, in order to have a fairly static number not affected by production which the quota itself is designed to control.

We can be fairly sure that Iran and Iraq followed the same reporting practices. It is noteworthy too that Algeria, another OPEC country, reported reserves of 9.2 Gb for eleven years despite production, that being the size of its largest field, Hassi Messaoud.

In short, no credence can be placed in the Reserves reported by the five Middle East key countries. The reported total is 694 Gb, but at the very least we have to deduct past production amounting to 238 Gb to deliver a more plausible 456 Gb. That itself probably reflects an excessive assumed recovery factor, since not all fields will match the best. If so, it might be prudent to reduce the number further to, say, 370 Gb. Apart from the reserves themselves we must give emphasis to extraction rate, which inevitably falls towards exhaustion, making the tail end reserves basically irrelevant to world supply.

Discovery is dominated by a small number of very large fields, found more than fifty years ago. Although exploration in recent years has been at a relatively low level, the countries concerned would certainly have tested the largest remaining prospects, which by their very size are found first. The reported recent discoveries from the countries themselves are no

doubt as unreliable as their reserves themselves, but taking a general look at the situation, it might be reasonable to attribute some 60 Gb to future discovery, giving a rounded total of, say, 660 Gb. If so, it appears that the Middle East is about 36% depleted, which does not sound unreasonable, considering that production commenced in the early years of the last century.

In the real world, it is hard to picture production being stepped up as the countries already face considerable challenges in offsetting the natural decline of their ageing giant fields, as exemplified by Ghawar. If production is held at the present level and exploration is reasonably rewarding, the midpoint of depletion would be reached between 2015 and 2020. The depletion rate would still be just under 2% which is a comparatively low one, so perhaps production at that level could continue to, say, 2025 before terminal decline sets in. Incidentally, the low depletion rate is further evidence against a larger resource base.

But if, for the sake of argument, production were stepped up over the next ten years by the admission of the western oil companies, the net result would be a steeper subsequent decline, making a bad situation worse. On the other hand, if the Muslim fanatic were to interrupt supply, he would, ironically, be doing an unintended favour by forcing the Western countries, which are the prime consumers, to face the reality of the constraints of Nature, which will bite in earnest in the years ahead.

Russia can increase production for a few years, making good the anomalous decline after the fall of the Soviets, the Caspian can contribute a little, and there is still some life in the deepwater. But this upside is more than offset the other established areas, which are already in terminal decline following the examples of the United States and now the North Sea and China.

In short, there is no way on earth by which the EIA notion of world production rising to 121 Mb/d by 2025 can be fulfilled. It is hard to believe that are oblivious of the facts and inferences explained above, which are self-evident from examination of the relevant data. The likely explanation is that they consciously or subconsciously deliver what their masters expect of them. Those in power want the bland illusion of “business as usual”, so that they may continue to extract support from their traditional constituencies, rather than face the reality of natural depletion imposed by Nature. In this, they underestimate the resolve of the deprived electors, who would much prefer to be told the truth. “Put your trust in the people”, said Winston Churchill, when facing an earlier crisis.