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Given the challenging oil scenario of high price volatility and dwindling reserves, India will have to focus on developing alternative sources for its liquid fuels, and manage demand to limit oil imports.

Bhaskar Balakrishnan

In recent months oil prices have shown high volatility, ranging from a high of \$147 per barrel in July 2008 to around \$63 at present. OPEC recently announced a production cut of 1.5mb/d to shore up falling oil prices. India, whose dependence on imported oil is up from a low of 32 per cent of total consumption in 1986 to 68 per cent in 2007, is particularly vulnerable to such violent price fluctuations. Here is a look at some of the factors at play.

Crude oil consumption rose at a compounded annual growth rate (CAGR) of 3.2 per cent during 2001-2006, and reached 2.75 mb/day in 2007. Domestic production is around 0.80 mb/day in 2007, while the proven reserves were 5.63 billion barrels in 2007, down from a peak of 8 billion barrels in 1991. This indicates that the oil production capacity from domestic sources has stagnated and will drop in future, unless there are new finds. The clear conclusion is that in order to sustain the present pattern of GDP growth, India will have to import increasing amounts of crude, and its dependence on imported oil will increase further. Some projections indicate a situation of 85 per cent import dependence by 2012.

Crude realities

The world oil scenario poses some challenges. According to the Hubbert model, world crude production will reach a peak and thereafter decline steadily as increasing consumption depletes finite resources. The only way out is if new oil discoveries are made, or if non-conventional deposits are exploited, in which case onset of the peak gets delayed.

In 2007, global oil production and consumption were around 81.5 mb/day and 85.2 mb/day, the difference being accounted for by changes in oil inventories of around 3.5 million barrels. The annual consumption of crude oil is 31.2 billion barrels and, since 1979, there have been no new additions to global oil reserves of this order.

BP estimates world proven crude oil reserves at around 1,238 billion barrels with additions at 1.3 per cent CAGR over the past 10 years. About 60 per cent of these reserves are in the Middle East, a region particularly prone to political instability. It follows that India's diplomatic and political engagement with this region will be increasingly critical.

According to the EIA, OPEC spare oil production capacity has shrunk from 7 mb/d in 2002 to just 1 mb/d in 2004. This implies a lower capacity to compensate for shortfalls in oil production caused by various events and translates into large price fluctuations as supply-demand imbalances can persist.

If spare capacity does not go up in proportion to total consumption, we can expect greater price volatility in future. "Swing" producers, such as Saudi Arabia, will play a key role in price movements. Iraq, which has high potential for increased production capacity if political conditions are conducive, could be of great help in stabilising oil prices.

According to some observers, the easily usable crude oil production is likely to peak around 2012, and decline thereafter, resulting in higher prices as demand continues to grow. At this stage, more expensive sources of oil will have to be tapped, such as deep-water oil exploration and production, and oil from tar sands, shale, etc.

Petroleum reserves

Yet another aspect is India's strategic petroleum reserve (ISPR), which was set up to deal with short-term disruptions in oil supply, including strategic and Defence needs in the event of a conflict. The ISPR provides for 37 mb of oil reserves stored in Karnataka and Andhra Pradesh, which could meet about two weeks needs in an emergency.

However, most other countries (China, Japan, the EU, etc.) keep reserves for 30 to 90 days, and also have mandatory requirements for private sector oil companies to maintain reserves. In this light, India's provisions of a strategic petroleum reserve seem quite inadequate.

The net result of the oil import situation has been to drive two processes. First, the thrust for greater domestic exploration, as evidenced by the successive NELPs and the oil and gas discoveries through the involvement of foreign and private sector players.

Second, an international thrust, seeking access to proven oil assets abroad, as well as participation in potential oil and gas areas.

In this direction, OVL has made good progress and has taken a stake in operations in 17 countries, including production operations in Sudan, Syria, Russia, Colombia, and

Vietnam, while production is expected in near future from Brazil, Myanmar, Egypt, Qatar, and Iran. In the long term, India will have to develop alternative sources for its liquid fuels, and also manage demand in order to keep its foreign oil dependence down as much as possible, as well as prepare for the days when oil and gas availability declines.

The transportation sector, which accounts for 35 per cent of liquid fuel consumption, being the largest consumer, should be the target of greatly intensified efforts to improve fuel efficiency, use electric propulsion and storage devices, etc. For this, it is crucial that the appropriate fiscal and tax incentives are given to manufacturers as well as users.

Better management and design of traffic systems in urban areas to reduce congestion, introducing mass transport systems, etc., will also improve overall fuel efficiency.

(The author is former Ambassador to Cuba and Greece. blfeedback@thehindu.co.in)

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