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Changing geo-politics of oil and the impact on India

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Abstract

Oil is a much sought after resource in the modern world economy. Until the previous decade, Middle East was thought to hold the maximum proven reserves of oil. This provided an incentive for western nations to maintain peace and stability in the region. However, discovery of new oil reserves in Brazil, Venezuela, Canada, Alaska and Russia, have challenged the status quo. Emerging Asian economies, namely India and China, will have to deal with an unstable supplier for one of the most important components in their energy portfolio. Given the situation, India is especially at risk as it imports almost 70% of its oil requirement, up to 65% of which originates from the Middle East. In a disruptive scenario of disturbance in the Middle East, India would find it difficult to meet its oil needs, jeopardizing its energy future. This paper analyzes India’s energy consumption pattern, consumption of oil and oil products over the past four decades and the composition of India’s oil import sources over the past five years. Finally, a model is proposed to secure India’s energy future.

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Keywords: India’s oil imports; Oil geo-politics; Energy security

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1. Introduction

1.1. Origin of oil

Oil is a vital source of energy for the world. It runs modern economies and yet the origin of oil is not well understood. There is no scientific proof of the biological origins of oil because unlike coal, there are no fossil remnants in it. However, current understanding in the industry says that oil is a fossil fuel.

Crude oil was formed from layers of dead organisms lying on the sea floor for millions of years. Over time, sand, clay, and limestone layers cover the rich organic sediments, choking out oxygen and allowing bacteria to break down the organisms.

As the organic-rich sediment is covered with more and more layers of earth, the weight of the overburden causes pressure and heat to transform the organic material into one of the various phases of hydrocarbon (natural gas, crude oil, or bitumen). Scientists call this organic-rich sediment layer the source rock, as it is where oil is created. It is estimated that this process takes millions of years. As such, oil is considered a finite source.

1.2. Conventional and unconventional oil

Conventional crude oil is extracted by drilling oil wells into petroleum reservoirs. However, given the huge demand for oil a large portion of such easily accessible oil has already been extracted. Oil production from places like Russia, Iran and Kuwait is plateauing. As an outcome of the resultant increasing oil prices, unconventional and hitherto uneconomical techniques of oil extraction have become viable. Technological innovations in extraction methods such as hydraulic fracturing and horizontal drilling have opened up reserves of oil and natural gas previously considered unobtainable. Some such reserves include:

- Ultra-deepwater, pre-salt reservoirs found off the central coast of Brazil
- Tight oil in the shale rock of North Dakota and Texas in the United States of America
- Bituminous oil sands in Alberta, Canada
- Oil reserves in the waters of the Arctic that become more accessible as global warming melts the Arctic sea ice (Walsh, 2012)
- Hydro-fracking revolution in natural gas found in the US, Argentina, Mexico, Canada has accelerated shift to natural gas-powered vehicles, reducing the demand for oil (Wright, 2012)

While unconventional oil sources promise to keep the supply of oil flowing, the flow will be more expensive, dirtier and prone to accidents than conventional oil. In fact, Michael Klare, an energy expert and the author of ‘The Race for What's Left’ says, ‘I'm less concerned about the absolute disappearance of fossil fuels than about the environmental consequences of pursuing what's left.’

2. Background of the Study

2.1. Proven oil reserves

Proven reserves are reserves claimed to have a reasonable certainty (normally at least 90% confidence) of being recoverable under existing economic and political conditions, with existing technology. Over the past two decades, proven oil reserves have increased by more than 60%. At the end of 2011, proven oil reserves reached 1652.6 billion barrels, sufficient to meet 54.2 years of global production (British Petroleum, 2012).
Middle East has the highest proven oil reserves in all of the three decades. Over the previous decade, proven oil reserves of all regions show an increase, however, the highest increment has been in the case of South and Central America. This is primarily due to increase in Venezuela’s proven oil reserves, which are claimed to be the largest in the world.

The center of gravity of oil exploration and production is shifting to the western hemisphere as new reserves are being discovered in Brazil, Venezuela, Canada, Alaska and Russia (Barnett, 2012). Major part of the conventional oil reserves still lie in the Middle East/Persian Gulf, however, new reserves and advanced technologies of extracting oil mean that one can predict a future where East and West would no longer fight over Middle East energy reserves.

2.2. World oil production and consumption

Oil forms an integral part of our daily life. Today, oil supplies about 40 percent of the world’s energy and 95 percent of its transportation energy. All aspects of modern life such as travel, work, purchase of goods or services, etc. have a significant oil footprint. As such, demand for oil has been rising exponentially over the past few decades. Rising oil prices on the international market have made explorations in hither to unreachable zones, feasible. As illustrated in figure 2, both oil production and

<table>
<thead>
<tr>
<th>Region</th>
<th>1991</th>
<th>2001</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>123.2</td>
<td>230.1</td>
<td>217.5</td>
</tr>
<tr>
<td>S. &amp; Cent. America</td>
<td>74.6</td>
<td>98.8</td>
<td>325.4</td>
</tr>
<tr>
<td>Europe &amp; Eurasia</td>
<td>76.8</td>
<td>102.4</td>
<td>141.1</td>
</tr>
<tr>
<td>Middle East</td>
<td>660.8</td>
<td>698.7</td>
<td>795.0</td>
</tr>
<tr>
<td>Africa</td>
<td>60.4</td>
<td>96.8</td>
<td>132.4</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>37.0</td>
<td>40.5</td>
<td>41.3</td>
</tr>
<tr>
<td>World Oil Reserves</td>
<td>1032.7</td>
<td>1267.4</td>
<td>1652.6</td>
</tr>
</tbody>
</table>

Table 1. Proven oil reserves (In thousand million barrels)

Source: Statistical review of world energy-2012, British Petroleum
consumption have risen consistently over the past years. Demand for oil is still rising. It is set to grow 800,000 thousand barrel a day in 2012.

It must be noted that differences between world consumption and world production statistics are accounted for by stock changes, consumption of non-petroleum additives and substitute fuels, and unavoidable disparities in the definition, measurement or conversion of oil supply and demand data.

Figure 2. World oil production and consumption

2.3. World oil consumption and production - Regions

Region-wise analysis of world oil consumption and production statistics reveals wide disparities between production and consumption of oil across regions. For instance, in 2011, Middle East accounted for one-third (33%) of world oil production and consumed less than one-tenth (9%) of total world oil consumption. This is in stark contrast with Asia Pacific region which produced one-tenth of the oil produced in 2011 and consumed almost one-third (32%) of oil consumed by the world in the same time period (British Petroleum, 2012).

Table 2. Production and consumption of oil in FY 2011 (In thousand million barrels)

<table>
<thead>
<tr>
<th>Region</th>
<th>Production</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>14301</td>
<td>23156</td>
</tr>
<tr>
<td>S. &amp; Cent. America</td>
<td>7381</td>
<td>6241</td>
</tr>
<tr>
<td>Europe &amp; Eurasia</td>
<td>17314</td>
<td>18924</td>
</tr>
<tr>
<td>Middle East</td>
<td>27690</td>
<td>8076</td>
</tr>
<tr>
<td>Africa</td>
<td>8804</td>
<td>3336</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>8086</td>
<td>28301</td>
</tr>
<tr>
<td>Total</td>
<td>83576</td>
<td>88034</td>
</tr>
</tbody>
</table>

Source: Statistical review of world energy- 2012, British Petroleum

The statistics indicate that Europe & Eurasia and Africa have only minor differences between their share of world oil production and consumption. On the contrary, North America and Asia Pacific are the only regions where the difference between their share of world oil production and consumption is significant. The reason behind such difference in Asia Pacific is that the region houses the emerging and oil guzzling economies of China and India. These countries have the highest share of world population but the lowest share of world’s proven oil reserves. This can be corroborated with figure 1 which shows Asia Pacific’s share of world proven oil reserves at a miniscule 2%.
As expected, country-wise analysis of world oil production statistics indicates that Middle Eastern countries (33%), Russian Federation (12%) and the US (9%) were the top producers of oil in 2011. It may be noted that India is conspicuous by its absence in the top ten producers of oil in the world.

Analysis of statistics related to major oil consumers in 2011, indicates that the US (21%), China (11%), Middle East (9%), Japan (5%) and India (4%) are the top consumers of oil in the world. Comparison of relative production and consumption statistics of the US show that the country produces...
less than one-tenth of the total oil production while it consumes more than one-fifth (21%) of oil consumed in the world. Similarly, China and India produce 5% and 1%, respectively of total oil production and consume 12% and 4%, respectively of the total oil consumed in the world (British Petroleum, 2012).

The gap in production and consumption of oil is met through imports from oil surplus regions such as the Middle East, South & Central America and Africa. Being dependent on foreign sovereigns for an energy resource as critical as crude oil, is a situation of concern for any country. Nevertheless, the distribution of oil reserves make such imports a necessity.

Upon first glance at figure 4, China and India do not seem to be worse off than the US which is more dependent on foreign production of oil. However, the US sources majority of its oil imports from friendly neighbors such as Canada and Mexico, South & Central America and Africa, rather than from disturbance and war-ridden Middle East. In fact, as per US Energy Information Administration, in 2011, US imported less than one-fourth (22%) of its oil imports from the Middle East.

On the other hand, India and China depend on the Middle East for a significant portion of their oil imports. Middle East holds the highest proven reserves of oil and is the largest producer of oil in the world. Therefore, it is natural that due to geographical proximity, transportation economies and ease of availability, emerging Asian economies like India and China are highly dependent on the Middle East for their oil requirements (Mitra, Pramit and Thompson, 2005). As such, it is very important to understand how political and economic undercurrents of the Middle East put the two Asian tigers in a vulnerable position.

2.5. Middle East – The excesses of too much oil

Prior to the oil era, Middle East was the breeding ground for religious conflicts and war by European colonists and imperialists who wanted to secure territory and control access to Asia. Since the discovery of oil and development of oil fields, in the 1940’s, the region has been host to ‘resource wars’. Oil not only motivated western countries to interfere militarily and destabilize non-pliant regimes but also affected balance of power within and between regional states.

Since 1947, the western countries, mainly the United Stated of America (US) purchased stability in the Middle East by funding pliant client regimes and setting up a string of military bases stretching from the Persian Gulf to Turkey. This ensured uninterrupted oil supply to the US. However, such western led policies led to creation of autocratic regimes and unstable petro states (Swami, 2012).

The vast revenues available to states and elites drastically increased inequalities in wealth and power. Despite religious and nationalistic ideologies and populist economic measures such disparity exacerbated internal dissent and instability. Instead of building infrastructure and industries, petro-states' rulers used the petro-dollars to establish patronage networks that ensured the survival of their regimes (Billon and Khatib, 2003). There were no incentives to engage in economic reforms, and easy cash killed entrepreneurship. In time, generous handouts led entire polities to develop an addiction to petro-dollars. The apparent prosperity brought by ‘black gold’ did not drive industrialisation or generate productive jobs in the Middle East.

As a result, protracted conflicts associated with oil, within and between competing regional states as well as foreign interests, have shaped up a violent geo-political reality in the Middle East. There are problems in the Middle East that have no solution in sight and that will directly affect the supply of energy from the Middle East. The growing rift between Sunnis and Shites, tension between the West and an increasingly radicalized Muslim world, increasing terrorist activity against oil facilities, protectionism, lack of investment, unresolved border disputes and the growing uncertainty about the political stability of key energy producers like Saudi Arabia, Iran, and Iraq are some such problems (Richardson, 2007).
The Middle East is presently equated to hotbed of simmering discontent, deepening ethnic and political tensions, terrorism, corruption and authoritarianism. All the countries that are dependent on Middle East oil reaped the benefit of relative stability and peace in the Persian Gulf at the cost of the US and other western countries.

However, now the US has little interest in Middle East. Falling demand for oil due to recession, conservation policies and discovery of unconventional sources of oil in North America, South & Central America and Africa mean that the US has less reason to continue pouring dollars or military might in the Middle Eastern countries. At present US resources will be more narrowly focused, targeting potential Chinese expansion in the Pacific and using intelligence led operations to contain terrorism related threats.

As a result, a new geo-strategic reality is shaping up. The Western Hemisphere doesn’t need the Persian Gulf as it has enough oil for its needs. India, China and other Asian powers whose economic success depends upon easy access to oil, will be the inheritors of the disorder, left behind by the western withdrawal.

China’s oil consumption and imports exceed those of India by a huge margin. However, China has been making all out efforts to secure oil resources by way of investing in high seas oil exploration and purchasing oil equity. While, India has taken similar steps, it lacks the foreign policy initiative or economic bandwidth to absorb the price volatility caused by disruption in its imports.

India is in especially risky position in light of the abovementioned situation. As such, India needs to follow a comprehensive energy security model that aims to reduce energy consumption, find alternative sources of energy, increase domestic oil production and diversify import sources of oil.

3. Research Methodology

This paper is based on analysis of secondary data obtained from the various government and corporate sources and information available on the public domain. The objective of the paper is to establish that India faces a potentially disruptive situation in terms of energy security and suggest a model to address the situation.

As such, the paper begins with an analysis of statistics related to proven oil reserves, recently discovered oil fields, new methods of explorations, world oil consumption and production of oil with an emphasis on India and with special reference to the stability and political situation in the Middle East.

Further, India’s energy consumption pattern, consumption of oil and oil products over the past four decades and the composition of India’s oil import sources over the past five years has been analyzed. Finally a model to secure India’s energy future has been recommended. The model suggests a three-pronged approach comprising structural adjustments in the energy sector, steps towards attaining energy efficiency and energy assurance. This would ensure availability, accessibility and affordability of energy resources in the country.

4. Data analysis and interpretation

4.1. India’s energy consumption

India’s energy-mix comprises both non-renewable (coal, lignite, petroleum and natural gas) and renewable energy sources (wind, solar, small hydro, biomass, cogeneration bagasse etc.) In 2009, coal comprised more than two-fifth (42%) of India’s energy consumption, while oil comprised almost a quarter (24%) of India’s energy consumption basket (Central Statistics Office, 2012). Notably, oil is a
non-substitutable resource which is used widely in transportation, industrial and power generation sectors. As such, the importance of oil in India’s energy mix cannot be understated.

Figure 5. India’s energy consumption pattern – FY 2009

India’s energy consumption has been increasing steadily over the last few decades. Factors such as population growth, modernisation of lifestyles, higher electrification rates and rapidly growing gross domestic product (GDP) in India drive this increase in energy demand. This has put pressure on the security, reliability and affordability of energy supply.

4.2. India’s oil consumption

Figure 6. Consumption of oil and oil products in India (in million barrels)
India’s oil consumption is the net of petroleum and petroleum product imports and exports. Consumption of oil has been increasing steadily for the past four decades. It is expected to follow a similar trend for the near future.

As has been mentioned before, India is a net importer of oil. The country produces less than 1% of world’s production of oil and consumes 4% of world’s oil consumption. As per EIA, Department of Energy, US, India imports about 70% of its oil requirements. Given, abysmally low reserves of the country, this trend is likely to continue for a long time to come.

4.3. India’s Crude Oil and Oil Product Imports

As seen above, India’s oil consumption is growing with every passing year. In 2011, India was the fifth largest consumer of oil in the world, after the US, China, Japan, Middle East and China. With production remaining flat and growing demand, between 2006-07 and 2011-12, India registered an increase of more than half (55%) in its oil imports, by quantity (Ministry of Commerce, 2012).

Table 3. Import of crude oil and oil products by India (In thousand barrels)

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</thead>
<tbody>
<tr>
<td>Middle East</td>
<td>537445</td>
<td>589283</td>
<td>639867</td>
<td>704531</td>
<td>656271</td>
</tr>
<tr>
<td>Non-Middle East</td>
<td>172964</td>
<td>177701</td>
<td>224918</td>
<td>317098</td>
<td>361973</td>
</tr>
<tr>
<td>Total</td>
<td>710409</td>
<td>766984</td>
<td>864785</td>
<td>1021629</td>
<td>1018244</td>
</tr>
</tbody>
</table>

Source: Export Import Database, Ministry of Commerce, Govt. of India

![Figure 7. Import of crude oil and oil products by India (In thousand barrels)](image-url)
The high dependence on imported crude oil has significant implications on energy security and the overall financial health of a country. Volatility in international crude oil price, caused due to supply side disruptions, exerts significant pressure on the foreign exchange reserves of the country. In addition to the obvious inconveniences of high dependence on imports of crucial crude oil, India’s problems are compounded by the fact that India sources a high proportion of its oil from the Middle East and rift torn regions of North Africa.

Analysis of import sources of oil reveals that India is heavily dependent on the Middle East for its oil imports. The energy security and national security problems resulting from reliance on a single energy resource that is primarily located in such a volatile area are likely to be intensified as demand for oil grows. The region’s problems will impact not only the world’s economy and security but also consuming nations’ attitudes and policies toward the region’s producers as well as toward each other. Such a situation has the potential to bring the country to a halt, both economically and physically.

For instance, in a scenario of war and disruption of oil production in the Middle East, both India and China, will be vying for limited production of crude oil to feed their oil hungry economies. This would lead to higher prices of oil and diplomatic tension between the two countries. As such, there is urgent need for action on the energy security frontier, especially with regard to crude oil.

5. Recommendations and suggestions

Energy security is ensured by guaranteeing three factors – availability, accessibility and affordability of energy resources (Planning Commission, 2007). India is at a critical juncture as far as its energy future is concerned. As has been mentioned before, India is heavily dependent on coal and crude oil for over two-thirds of its energy needs. Coal represents unclean technology which causes emissions of greenhouse gases and pollution (The Energy and Resources Institute, TERI, 2009). Moreover, in the near future, India is likely to face problems in sourcing crude oil from the countries which have traditionally been supplying oil to it. As such, India needs to follow a comprehensive three-pronged approach for securing its energy future.

5.1. Structural adjustments in energy sector

India needs to exploit clean sources of energy such as natural gas and clean coal to reduce greenhouse gas emissions and reduce the country’s dependence on crude oil. Moreover India is endowed with abundant natural and renewable resources of energy such as sun, wind and biomass. The available renewable resources need to be exploited by giving them a commercial orientation.

Nuclear energy has the potential to meet the future needs of electricity demand in the country. The country has developed the capability to build and operate nuclear power plants observing international standards of safety. The country has a comprehensive nuclear power generation program in place. However people’s resistance to nuclear power is leading to delay in implementation of the plan.

There is need for development of energy infrastructure such as refining capacity and marketing and distribution facilities commensurate with demand. Investment in human resource development and technological upgradation are other structural changes that will take India a step closer to achieving energy security.

5.2. Energy efficiency

Reducing energy requirements and increasing energy efficiency are two important pillars of attaining energy security. Energy efficiency is the equivalent of creating a virtual source of untapped domestic
energy supply. Efficiency can be increased in energy extraction, conversion, transportation as well as in consumption. There is a need to enforce energy consumption standard and technologies for efficient energy in energy intensive sectors. International benchmarking of energy consuming and producing sectors will be a step in the right direction. Promotion of research and development on fast breeder reactor and thorium-based technologies for nuclear power, solar, gas hydrates, clean coal technologies, fuel cells, etc will help achieve energy efficiency. Other measures include reduction of technical losses on transmission and distribution, improving efficiency of vehicles, electrical appliances, etc.

5.3. Energy assurance

Ensuring energy security requires dealing with various risks. The threat to energy security arises from supply risks and the uncertainty of availability of imported energy, possible disruptions or shortfalls in domestic production and strikes. There can be the market risk of a sudden increase in energy price and even when the country has adequate energy resources, technical failures may disrupt the supply of energy
to some people. Generators could fail, transmission lines may trip or oil pipelines may spring a leak. One needs to provide security against such technical risks.

Effective strategies to counter concerns of energy security include maximising domestic production, diversifying the fuel mix and import sources of oil, investing in equity or ownership of oil or gas assets abroad, creating strategic domestic reserves of oil and maintaining a manageable level of import dependence.

Oil exploration in deep offshore and frontier areas will help in increasing domestic production. In the past few years India has started making efforts to diversify its oil import sources. For instance, oil imported from countries such as Nigeria, Venezuela, Mexico, Malaysia comprised as much as 19% and 17% of the total oil imports in 2010-11 and 2011-12, respectively (Ministry of Commerce, 2012). Obtaining oil or gas equity in producing assets overseas ensures relatively uninterrupted supply of the hydrocarbons to the country.

To ensure energy security, the Government of India has started building strategic crude oil storages at three locations namely, Visakhapatnam, Mangalore and Padur (near Udupi). These storages would hold 37,400,000 barrels (5,950,000 m³), enough oil for two weeks consumption (Planning Commission, 2007). These strategic storages would be in addition to the existing storages of crude oil and petroleum products with the oil companies and would serve as a cushion in response to external supply disruptions. However, due to some issues with the underground caverns that were to be used for storage of oil, the project has been delayed by a year, pushing the date of completion to 2014.

6. Conclusion

India is one of the fastest growing economies of the world. Crude oil is essential to the growth of an economy. India has low domestic reserves but high oil requirement. The difference is met by imports. However, high import dependence and the profile of sources of imports of crude oil and oil products pose a major problem to the country’s energy security. Energy security is doubly important for developing countries which invest capital in refining capacity and infrastructure to improve market access but face issues in securing energy sources; crude oil. Therefore there is an urgent need to follow a holistic energy security model to secure India’s energy future and give our future generations a future they deserve.

More specifically, India must make structural adjustments in the energy sector by developing and exploiting clean and renewable sources of energy, developing energy infrastructure and investing in skill development and technological upgradation. Additionally, steps must be taken to achieve energy efficiency by enforcing consumption standards and technologies, building more efficient national power grid and promoting research and development in the efficient technologies. Finally, assured supply of energy must be attained by maximising domestic production, diversifying the fuel mix and import sources of oil, investing in equity or ownership of oil or gas assets abroad, creating strategic domestic reserves of oil and maintaining a manageable level of imports.

References


