Review of Petroleum & Natural Gas Sector

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Abstract: ***Today availability of e-resources in a university library is very common. But their proper and maximum use is a matter for discussion. The present paper examines the existence of various e-resource databases in Library and Information centre. The study also highlights the preferences and importance of online resources among the teachers and research scholars.***

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INTRODUCTION

Advances in computer applications during the past few decades have brought radical changes in the way information is gathered, store, organized, accessed, retrieved and consumed. The application of computers in information processing has brought several products and services to the scene. The Internet and the Web are constantly influencing the development of new modes of scholarly communication; their potential for delivering goods is quite vast, as they overcome successfully the geographical limitations associated with the print media. Further, the distribution time between product publication and its delivery has been drastically reduced. The Internet can be used for efficient retrieval and meeting information needs. This is very important for university libraries since most of them call for more and more research work. This important fact is convincing many libraries to move towards digital e-resources, which are found to be less expensive and more useful for easy access. This is especially helpful to distant learners who have limited time to access the libraries from outside by dial-up access to commonly available electronic resources, mainly CD-ROM, OPACs and Internet, which are replacing the print media.

Libraries have witnessed a great metamorphosis in recent years both in their collection development and in their service structure. Over the last several years, a significant transformation has been noticed in collection development policies and practices. Print medium is increasingly giving way to the electronic form of materials.

OBJECTIVES

The main objective of this study is to analyze dependency of the teachers and research scholars on e-resources, the perceived impact of the e-resources on their academic efficiency and problems faced by them while using the e-resources. This survey was particularly conducted to assess the benefits of the e-resources over conventional sources of information.

Some of the major objectives are to:

- know the different types of electronic resources and services available in the GGSIU library;
- study the different types of electronic resources used by teachers and research scholars;
- study the purpose and frequency of using the electronic resources and services available in the library;
- locate the impediments faced by the teachers and research scholars while accessing and using the electronic resources in the library;
- study the impact of electronic resources and services on the academic work of the teachers and research scholars;
- know the productivity and quality of information retrieved through e-resources.

PREVIOUS STUDIES

A number of relevant studies have been carried out on the use of e-resources by teachers, students and research scholars of universities and research organizations. Seventy-eight percent of the respondents feel that the use of the UGC-Infonet e-journals has created high dependency value on their research work and they needed current article alert services and electronic document supply services (Madhusudhan 2008). 67.64% of research scholars of faculty of science and 69.23% of research scholars of engineering use e-journals for research work whereas 35.29% of sciences use e-journals to update knowledge and 23.70% of engineering use these for study. Speed of availability and the ease of accessibility of information causes the users to use electronic resources more frequently. 49% of respondents are marginally satisfied with online services provided by

the library. The survey indicates that the use of e-resources in Jamia Milia Islamia is not satisfactory and needs constant guidance/orientation to enhance their usage. E-journals are becoming a basic need for the academic research scholars every day. Navjyoti finds that speedy publication and availability on the desktop are the key advantages that attract research scholars. Lack of training is a major de-motivating factor in the usage of e-journals, so that needs to be improved. Kennedy proposes the inclusion of Web pages to the library catalogue as a solution to the maintenance of increasing web site links. Kaur reports e-resources can be good substitutes for conventional resources if the access speed is fast, access to all the important e-journals is provided and more computer terminals are installed to provide access to e-resources. Renwick recommends there be greater promotion of the library's e-resources. Kaur and Verma find that users use all the sources available to them regularly, like CD ROMs, online databases, Web resources and audio/video tapes.

SURVEY DESIGN

A questionnaire survey was conducted to collect the information regarding the use of e-resources, frequency of use of e-resources, purpose of using e-resources, frequency of locating desired information, problems faced by the users while using e-resources. A total of 100 questionnaires were distributed to collect the primary data out of which 82 questionnaires were found usable for analysis. The questionnaires were completed by personal visits with users. Questionnaires were distributed randomly to the users. The collected data was analyzed and presented in the tabular form.

DISCUSSION

Table 1. Use of Various E-Resources

Databases	Respondents	
	Teachers	Research Scholars
E-Journals	46 (88.46%)	28 (93.33%)
E-Data archives	8 (15.38%)	2 (6.67%)
E-Manuscripts	6 (11.53%)	2 (6.67%)
E-Maps	4 (7.69%)	4 (13.33%)
E-Books	16 (30.77%)	5 (16.66%)
E-Magazines	14 (26.92%)	19 (63.33%)
E-Thesis	5 (9.61%)	3 (10.00%)
WWW	30 (57.69%)	23 (76.66%)
E-Newspaper	14 (26.92%)	3 (10.00%)
E-Mail	41(78.84%)	18 (60.00%)
E-Research Reports	16 (30.77%)	15 (50.00%)
E-Bibliographic Databases	10 (19.23%)	3 (10.00%)

Table 1 shows that the majority of the teachers 46 (88.46%) and research scholar 28 (93.33%) prefer to use e-journals. Second highest preference is WWW and use of e-mail with 30 (57.69%) and 41 (78.84%) among teachers whereas 23 (76.66%) and 18 (60.00%) among research scholars. 50% of research scholars and 30.77% of teachers make the use of e-research reports. Table 1 highlights that only the well-known e-resources are preferably used by the researchers and faculty members, the rest of the e-resources i.e. e-bibliography, e-maps, e-thesis, e-books are comparatively less used.

Table 2. Ease of Access to E-Resources

Respondents	Total	Yes	No
Teachers	52	42 (80.77%)	10 (19.23%)
Research Scholars	30	26 (86.67%)	4 (13.33%)

[1] *In UK, households that spend less than 10 percent of their income on heating their homes are officially stated to suffer from fuel poverty.*

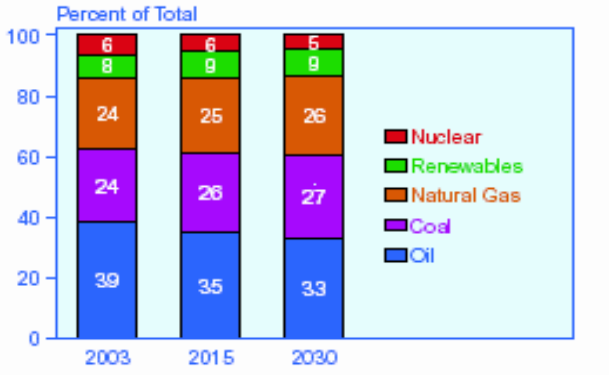
Thus, it may be seen that both the countries have devised a long-term plan keeping in mind the available resources

with the country. Besides, wherever resources are deficit, efforts are being made to reduce dependence on them. Details of approaches adopted by Japan and China are discussed under 13.5. Annexure III: Energy Policy in Asian Economies.

GLOBAL OIL SCENARIO

World oil use is expected to grow from about 80 million barrels per day (mbpd) in 2003 to 98 mbpd in 2015 and 118 mbpd in 2030 as per Energy Information Administration (EIA), International Energy Outlook (IEO) 2006.

In the IEO 2006 reference case, world oil prices rise from $31 per barrel (in real 2004 dollars) in 2003 to $57 per barrel in 2030, and oil's share of total world energy use falls from 39 percent to 33 percent. Shift in energy mix over the period of time is shown in the chart.



To meet the projected increase in world oil demand, total petroleum supply in 2030 will need to be 38 mbpd higher than the 2003 level of 80 mbpd. Of this, China is projected to consume additional 9.4 mbpd, US 7.5 mbpd and Asia (other than China & India) 6 mbpd. The balance growth is expected in South America, Africa and Middle East. As per the same report India is expected to consume additional 2.2 mbpd 2. OPEC producers are expected to provide 14.6 mbpd of the increase. Higher oil prices cause a substantial increase in non-OPEC oil production—23.7 mbpd, which represents 62 percent of the increase in total world oil supplies over the projection period. In addition, unconventional resources (including biofuels, coal-to-liquids, and gas-to-liquids) are expected to become more competitive. In 2003, world production of unconventional resources totalled only 1.8 mbpd. Unconventional resource supplies are expected to rise to 11.5 mbpd and would account for nearly 10 percent of total world energy supply in 2030.

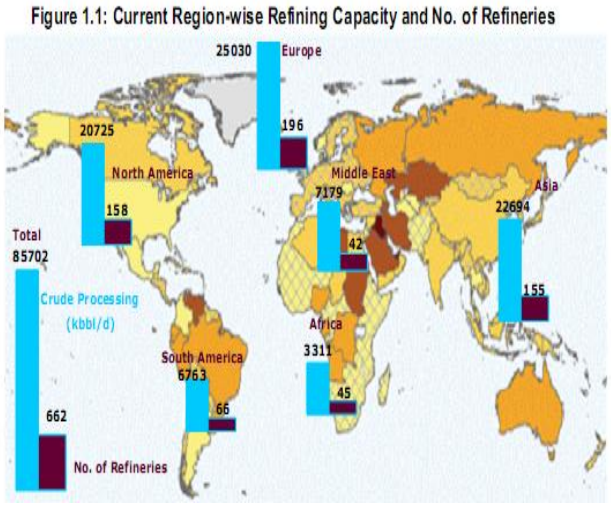
GLOBAL E&P SCENARIO

E&P activities world over are on the rise with spurt in crude oil and natural gas prices in international market. Consequently, increase in demand-supply gap in E&P services and availability of technical manpower, are new challenges for E&P companies. The shortage of rigs, seismic survey crews and technical manpower is increasing the E&P costs. However, despite these constraints, the rise in crude oil and natural gas prices is motivating E&P companies to search for hydrocarbons in frontier and logistically difficult areas including deepwater. Few issues of importance in the current international petroleum scenario are discussed below:

ƒ **Deep-water exploration in the world**: World over oil companies are venturing in this frontier area, particularly in Gulf of Mexico, North Sea and Western Offshore Africa.

[2] *Current Indian demand (during 2005-06) is about 112 MMT or 2.24 Mb/d*

Figure 1.1: Current Region-wise Refining Capacity and No. of Refineries



ƒ **Pursuing development and production from established/ageing fields**: Technological innovations are made to reduce E&P costs and increase recovery. Identification of cutting-edge technology is a key to developing ageing fields.

ƒ **Privatization of energy sector in developing regions like East Asia and Pacific, Latin America, CIS, South Asia**: Such opportunities need to be assessed as

these regions are historically, ideologically, politically and culturally, similar to India.

ƒ **Strategic alliances to reduce/share risks in marginal field exploration and development**: Companies have already entered into such alliances in acreages in India. The experience can be extended to preferred partners in overseas ventures.

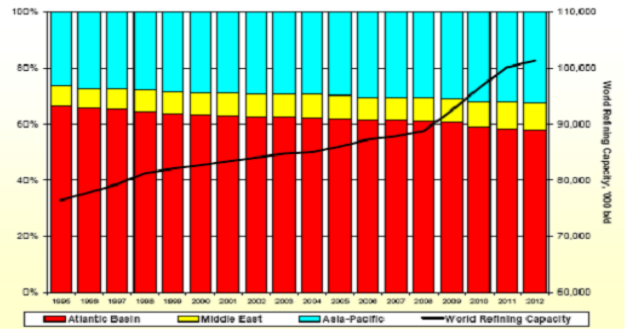
ƒ **End-product marketing by oil companies engaged in E&P**: Major oil companies are vertically integrated with all the three sectors of petroleum industry - upstream, downstream and marketing.

ƒ **Asset/Activity based E&P management through multi-disciplinary teams**: In 1990s, major E&P companies and some NOCs started reorganizing themselves into asset based small companies. This structure, with a multi-disciplinary team of geoscientists and engineers, has turned some of the marginal producing properties commercially viable. Besides, a trend of strategic alliance with service companies has also emerged so that the service companies are now directly participating in E&P activities by providing technological solutions to field specific problems.

ƒ **Information technology for strategic advantage**: Prodigious growth in information technology is being utilized by multi-disciplinary teams for Data- warehousing/interpretation etc. and seamless online connectivity for timely quality decision-making.

ƒ **R&D**: Efforts in R&D are focused towards continuous improvement in efficiency and cost-effectiveness of E&P techniques besides attaining a technological edge over competitors and solving new technological challenges.

Figure 1.2: Region-wise Trend in Refining Capacity Additions



world refining more toward the Asia-Pacific region.

GLOBAL REFINING SCENARIO

Global refinery scenario particularly that of Asia is turning attractive. In Europe, there has been no substantive addition in the refining capacities. At a number of places refineries are being closed down because of environmental concerns and uneconomic size. In the US, refining capacity has increased marginally. In Central Asia, the refineries are old and require a huge dose of investment. The only area, which has seen a spurt in refining capacity, is the Middle East, India and China. The average annual growth rate of refining capacity in the last one decade in the world is 1.2 percent. Most of this capacity addition has been in Asia-Pacific region, which contributed about 56 percent of the capacity addition. The current regionwise refining capacity is shown in the Figure 2.1.

The next five years are projected to be crucial for refineries. Cracking margins are expected to remain strong with strong forecast for oil demand growth coming from Asia Pacific and the US and move throughout the world towards cleaner fuels. It is expected that early movers could benefit strong margins for several years.

Figure 2.2 shows the trend in refining capacity additions in the Atlantic Basin, Asia Pacific and Middle East Regions. It may be seen from the graph that over a period of time the refining capacity share of the Atlantic Basin is reducing and the share of Asia Pacific region is increasing. This is in line with the trend of maximum refining capacity being added in the Asia Pacific region. The world refining capacity at the end of 2010 is expected to be about 94 mbpd and around 102 mbpd in 2012. The significant expansion of capacity forecast for China and India would have the effect of pulling the locus of Thus, there appears to be an excellent opportunity for capacity augmentation in the Asia Pacific region. Asia, including India and China, are projected to account for half the incremental consumption. Asia in general is projected to be the centre of growth for the next few decades. This perhaps is an opportune moment for the domestic refining industry to take up this challenge and make India a major refining destination. The viable route, therefore, would be to export surplus products and value-add by production of petrochemicals/polymers and other chemicals. New refineries would necessarily need to meet the projected fuel standards of developed countries to access those markets. Further, India has a geographical advantage due to proximity to source of oil and emerging markets.

GLOBAL NATURAL GAS SCENARIO

The oil and gas producers and users across the world are sitting up and revisiting their strategies in view of the increasing prices. The issue of energy security and broad-basing the energy portfolio has become every country's priority.

Natural gas, accounting for 24 percent of the total global primary energy supply, is the third largest contributor to the global energy basket. Natural gas consumption is expected to increase at an average of 2.4 percent per year from 2003 to 2030 as per EIA, IEO 2006. Among the end-use sectors, the industrial sector remains the largest consumer of natural gas worldwide, accounting for 52 percent of the total incremental demand for natural gas between 2003 and 2030. Natural gas is also expected to remain an important energy source in the electric sector, particularly for new generating capacity.

In a global context the natural gas era has truly begun during the last five years. With cross border gas trade becoming a Hobson's choice for gas producers who aspire to achieve real business growth, the global gas markets are fast integrating, the commercial models are undergoing rapid changes and the market structures are evolving and fast changing. More importantly, the Asian gas markets are leading the growth in global gas sector, with special investment focus on countries like India and China.

Integration of Global Gas Markets has by far been the most significant development during the period 2002-07. LNG has been one of the key drivers of this integration. With an almost 75 percent increase in liquefaction capacities from 87 MMTPA to more than 150 MMTPA over the past 10 years, the share of LNG in global gas trade has grown from 14 percent to 26 percent. This has also been supported by the fact that there is a continuous lowering of cost across the LNG value chain, which has transformed the LNG economics. This has contributed to establishing LNG as a major viable and flexible option. By meeting the buyers' expectations through price and contractual flexibilities, price review option and destination flexibility, LNG trading has emerged as a truly global and mature business.

At the same time, trans-national gas pipelines have continued to be a dominant gas supply option, especially between contiguous nations, and have emerged as a dominant integrating factor. The Russia–Poland–Central Europe pipeline, the Blue Stream project connecting Russia and Turkey via the Black Sea, the idea of a Northern Trans–Europe Gas pipeline connecting Russia to Finland and the UK via the Baltic Sea indicate the integration on the European side. On the Asian side, the Iran-Pakistan-India Pipeline, the Myanmar-India Pipeline and the Turkmenistan-Afghanistan-Pakistan-India Pipeline are receiving the highest attention from the concerned Governments.

Thus, integration of gas markets has become a necessity primarily due to five important reasons :

a) Firstly, gas has emerged as an important alternative source of energy. The Reserve to Production ratio of gas at 67 years continues to be ahead of oil at 40 years. There is therefore an economic imperative for faster monetization of gas reserves from a commercial perspective of the producing nations.

b) Secondly, the top 15 gas producing nations, except the US, having 78 percent of the global gas reserves, account for only 27 percent of the global consumption. Therefore, they have an inescapable need to look for marketing their gas globally.

c) Thirdly, there is an overall globalization trend in all businesses, backed by an

Information Technology boom and 24 X 7 communication links.

d) Fourthly, the Asian boom has a very important role to play in this area. The gas markets in China and India are shaping out to be major drivers of growth. With China's energy demand growing by 15 percent and India's by 7.8 percent, these two Asian giants are projected to be the leading gas consumers by the year 2020.

e) Finally, the spiralling oil prices and the uncertainty on the pricing front are helping to shape the gas market. In this regard, two interesting trends in the oil sector need a special mention:

- The rate of growth of world oil supply is constantly reducing and a flatter trend in the future is becoming apparent.
- The oil prices might settle at comparatively higher levels.

The implications of this integration through global gas trades, propelled by the five factors mentioned above, are far reaching - economically, strategically and, indeed, politically too.

The most integrated gas market today is the European market. The effective integration of sources and markets in Europe not only resulted in physical demand being met but also ensured the lowest gas prices amongst the gas importing nations. The European Union (EU) Gas Directive took decisive shape during 2002-07, driving the gas market reforms of the member nations. The Energy Charter Treaty Secretariat based in Belgium has been

playing an active role in enabling smooth trade among the EU Nations.

The focus now is on the integration of the Asian markets, which would provide the major platform for growth for the global gas sector. Asia today accounts for 70 percent of the total LNG trade; Japan and Korea are meeting their entire gas requirement through imports. Natural gas accounts for 3 percent of China's primary energy consumption and 9 percent of that of India. These two countries today account for less than 3 percent of the global gas consumption. But, with greater integration of the natural gas markets at a global level, the share of natural gas consumption in China and India together is expected to account for more than 17 percent of the total global natural gas consumption by the year 2020 as has been reported in the Energy Intelligence Agency Global Energy Forecast 2004.

Therefore, the next 15 years should be very exciting years for both India and China for the development of their gas sectors through integration with global gas markets. The following table provides an overview of the expected trend in the LNG Trade:

Table 2.1: LNG Global Trade Projections

Year	LNG Global Trade (MMTPA)	% Share in World Gas Trade
2003	1	2
2010	1	29-31
2020	3	3

Oil and gas policy, a subset of energy policy, will follow from the assessment of available domestic resources, requirements of growing economy, needs of the citizens, and the emerging global environment. Towards this end, the action taken by the Planning Commission in finalizing the report of the Integrated Energy Policy (IEP) wherein the assessment of the resources and their likely availability of supplies have been dealt with in details. However, the overview of the petroleum and Natural Gas sector in India is as under:

INDIAN SCENARIO:

The structure of primary energy consumption in India shows that coal (51 percent) dominates as the major energy source. Hydrocarbons (45 percent) is the next available energy provider of the nation. Natural gas is fast emerging as an alternative; it meets around 9 percent of the primary energy needs. Considering the global trend of shift in energy mix from oil to gas, the share of gas in consumption pattern, in the Indian context, is also likely to increase gradually in the days to come.

Currently, India's consumption (111.9 MMT in 2005-06) of petroleum products is only about 1/5th of world's average per capita consumption. In the X Plan (2002-07), the growth in consumption is expected to be around 2.6 percent per annum. In India, the indigenous production of crude oil has not been increasing in tandem with the consumption/demand of petroleum products. Government of India, under the NELP program, has already given a number of blocks for exploration, to various national and international agencies.

The hydrocarbon industry has been passing through very turbulent and challenging times for the last few years. The increasingly stringent environmental regulations, emergence of natural gas and soaring crude prices have thrown up challenges to the oil industry on one hand and opportunities on the other hand, such as gas business. Although natural gas is now being used as transport fuel the liquid fuels have traditionally remained the mainstay of hydrocarbon industry. There has been emphasis and quest for cleaner alternatives and CNG has merged as an alternative fuel.

The crude oil and gas reserves as on April 1, 2006 stand at 756 MMTOE and 1,075 BCM respectively. In 2005-06, crude oil and natural gas production by ONGC, OIL and Pvt/JV companies was about 32.19 MMT and about 32.20 BCM respectively.

SURPLUS REFINING CAPACITY AND POTENTIAL FOR AN EXPORT HUB

India has at present 18 refineries with refining capacity at 132.47 MMTPA. At the end of the X Plan (2007) the refining capacity is expected to reach 148.97 MMTPA against the consumption of about 114 MMTPA thereby resulting into surplus of refining capacity. India's export performance has also been very impressive. India has turned into net exporter of petroleum products from 2001-02 and during the year 2004-05 the net exports were 8.7 MMT. During the year 2005-06, India exported 21.50 MMT of products mostly comprising of Naphtha, Petrol, Aviation Turbine Fuel (ATF) and Diesel. By these exports about Rs. 46,785 crore of revenue was generated by the refining sector. Thus, the Ministry and companies are taking initiative for exploiting the potential for an export hub in India for petroleum products based on the export opportunities available in South East and East Asian countries.

STATUS OF PRODUCT PIPELINES

Cross-country pipeline networks, preferred as a cost-effective, energy-efficient, safe and environment friendly

mode for transportation of crude oil and petroleum products, have been playing a vital role in meeting India's energy demand. They are now a key constituent of the country's infrastructure, transporting crude oil from import terminals as well as domestic sources to inland refineries, and finished products from refineries to major consumption centres.

Creating sustainable transportation system through cross-country pipeline in the next few decades with the objective of preserving environment and protecting human health and safety would be the great challenge for the petroleum industry. As on 1.4.2006 India has around 7,696 kM of product pipeline in the country with total capacity of around 55.58

MMTPA. In addition there are 1850 kM of LPG pipelines with a capacity of 3.83 MMTPA. During 2005-06, capacity utilization of product pipeline in the country was around 60 percent only. The share of product movement through pipeline was only 32 percent of total POL (Petroleum Oil and Lubricants) consumption as compared to more than 62 percent in developed countries.

IMPROVEMENT IN AUTO FUELS

With the introduction of improved auto-fuels, the quality of fuels in India is better than in most countries of the region. The following programme for introduction of improved fuels has been implemented in the country as decided by the Government.

ƒ Euro-III Petrol & Diesel has been introduced from 01.04.05 in all 11 identified cities (Delhi/National Capital Region. Mumbai, Kolkata, Chennai, Bangalore. Hyderabad, Ahmedabad, Pune, Surat, Kanpur and Agra).

ƒ Introduction of Bharat Stage – II (BS-II) Petrol throughout the country by 01.04.05.

ƒ Introduction of BS II Diesel in all states except Rajasthan, West U.P., Uttaranchal, Madhya Pradesh, Punjab, Himachal Pradesh, and Jammu & Kashmir by 1.4.2005.

ƒ Introduction of BS II Diesel in the above states in a phased manner completed by 1.10.2005.

GLOBALISATION AND DIVERSIFICATION EFFORTS

The Indian economy is set to grow at the fastest rate ever in the coming decades with a major thrust being to manufacturing and services sector as well as formation of Special Economic Zones (SEZs). India, traditionally an import dependent country, has set forth a clear agenda for development of the energy sector in the coming decades with a clear emphasis on stepping up the steam on domestic production while simultaneously pursuing various import options. The government policy clearly emphasises the need for energy security through diversification of energy resources while integrating with the global trends to emerge as an important player in the global arena.

In view of unfavourable demand–supply balance of hydrocarbons in the country, acquiring equity in overseas oil and gas assets is one of the important components of enhancing oil and gas security. The Government is encouraging oil PSUs to aggressively pursue equity oil and gas opportunities overseas. OVL has made an investment commitment of over US$ 5 billion and has an oil and gas production of 6.6

MMTOE (Oil and oil equivalent gas) in the year 2005-06. OVL has a target to produce 20 MMTPA of O+OEG by 2020. OIL, IOC and GAIL are also engaged in acquiring overseas E&P assets. In addition, private Indian companies like RIL and Essar are also pursuing E&P opportunities abroad.

In the context of energy diversity, natural gas is expected to play a major role in diversifying the energy options. New domestic finds and LNG imports have made the market quite vibrant in recent times.

Retail & Marketing companies took big strides in new growth areas during the X Plan period towards globalisation and diversification in to related areas. Among these, initiatives are upward integration into E&P, diversification to natural gas and forward integration into petrochemicals business. Companies are gearing themselves for setting up mega petrochemical hubs with world scale plants. Companies are also progressing well in tapping opportunities in neighbouring countries for export of its products and services.

PRICING POLICY

The country has been witnessing sharp and spiralling increase in international oil prices combined with considerable volatility since the end of 2003. Another trend being noticed in the international market in recent months is that the prices of some sensitive petroleum products have been moving faster and with greater volatility than the prices of crude, depending on seasonal and regional demands for these products globally.

The prices of crude oil in the international market have increased steeply. The crude oil price of Indian basket has gone up from about $23 per barrel during March 2002 to $ 55.72 per barrel for April 2005 to March 2006 average. The average for April 2006 to October 2006 is $66.25 per barrel representing an increase of about three times.

Considering the impact of the price increase on common man and economically vulnerable sections of the society, Government has not increased the domestic prices of sensitive petroleum products in line with international prices. Holding the price-line has taken its toll on public sector oil marketing companies. Oil Marketing Companies (OMCs) namely, Indian Oil Corporation (IOC), Hindustan Petroleum Corporation (HPCL), Bharat Petroleum Corporation (BPCL) and IBP Ltd, as a result have suffered losses.

Government has taken several measures to contain the increase in domestic prices. From March 2005, customs and excise duty on PDS Kerosene and Domestic LPG has been made nil. Customs duty on petrol and diesel has been reduced from 20 percent in March 2004 to 10 percent currently. Ad valorem excise duty for diesel has been reduced from 14 percent in March 2004 to 8 percent. For petrol, the reduction has been larger from 30 percent in March 2004 to 8 percent at present. In addition to the tax relief, Government is also directly absorbing a part of the burden. Government has decided to issue oil bonds to the oil marketing companies to compensate them for their losses.

Several experts have forecast an era of high oil prices to continue. With the country's high oil import dependence, it is necessary that petroleum products be priced in a consistent manner under a long-term policy. It is also essential that economic pricing is blended with social responsibility so that the oil sector continues to function and service the oil needs of the economy.

NATURAL GAS SECTOR:

India is fast emerging as the focal point for the future development of the Asian natural gas market. In recent years, the Indian gas sector has received a progressively growing attention from global companies and has made rapid strides. The rapid growth of the Indian economy in the X Plan has greatly contributed to the development of the Indian energy sector as a whole and provided a major trigger for the growth of the gas sector as well. While gas occupies only about 9-10 percent of the total energy basket, primarily due to supply constraints all these years, the scenario is fast changing.

With the advent of LNG and progressive de-regulation of the gas prices, the natural gas sector in India is moving towards certain degree of maturity with better understanding of the pricing mechanisms. Reflecting this, the first spot cargo of LNG brought in by GAIL truly launched India on the global gas map with global suppliers showing serious interest on the Indian gas sector.

GAS INFRASTRUCTURE

On the supply side, there are two LNG terminals at Dahej and Hazira in Gujarat which are already operational with a total existing capacity of 7.5 MMTPA. The third terminal in Dabhol with a capacity of 5 MMTPA is under commissioning. There is another terminal at Kochi which is taking a final shape for implementation.

In terms of transmission pipelines, there is an existing network of 6,300 km including the Hazira-Vijaipur-Jagdishpur (HVJ) network, Dahej–Vijaipur Pipeline (DVPL) and other regional networks. During the X Plan, pipelines like the DVPL, Kelarus–Malanpur Pipeline, Thulendi–Phulpur Pipeline got commissioned. A number of pipelines, including those by the private sector, are at various stages of implementation and are likely to be implemented during the XI Plan.

The city gas distribution sector has simultaneously grown with the gas sector growth. From coverage of just 2 cities at the beginning of the X Plan, the city coverage has grown to 10 in 2005-06 across the western, northern and southern regions of the country. Currently, there is a total city gas distribution network of about 6,000 km. As far as Compressed Natural Gas (CNG) supplies are concerned, there are 278 stations dispensing CNG in the country and the number is expected to continuously grow in the coming years.

PRICING OF NATURAL GAS

In the beginning of the X Plan period, under the Administered Pricing Mechanism (APM), gas produced from the nominated fields of ONGC and OIL was priced at Rs.2,850 per 1000 Standard Cubic Metre (SCM) uniformly for all customers except in North East, wherein the customers were charged a price of Rs.1700 per 1000 SCM. Even the gas procured by GAIL from JVs and sold under APM was similarly priced, with the subsidy being met by ONGC.

With effect from 1.7.06, the gas pricing for APM gas was changed. It has been decided in the pubic interest that all available APM gas would be supplied only to the power and fertilizer sector consumers against their existing allocations along with the specific end users committed under Court orders and small consumers below 50,000 SCMD, at the revised price of Rs. 3,200/MCM and calorific value of 10,000 Kcal/cubic meter.

All other consumers would be supplied natural gas at market related price depending on the producer price being paid to joint venture and private operators at landfall point, subject to a ceiling of ex-Dahej RLNG (re gasified LNG) price of US $ 3.86/MMBTU for 2006-07.In case of

reduction in availability of this gas in future, the supplies to APM consumers would be reduced on a pro-rata basis.

The price of gas for the North–Eastern region will be pegged at 60 percent of the revised price for general consumers. Thus, the consumer price for the North-East region has been increased from the existing price of Rs. 1,700 to Rs. 1,920/MCM. Also, w.e.f. 1.07. 2006, ONGC will get a fixed producer price of Rs. 3,200/MCM till Government takes final decision on their prices. Producer price for OIL will be considered as equal to that of ONGC.

FREE MARKET GAS

Under this category falls the gas supplied by the JV/Private sector, re-gasified LNG and new gas supplies by ONGC and OIL. It may be noted that the gas supplies by the JV/Private sector are governed by the provisions under the PSCs. Similarly, the gas produced under NELP would be governed in terms of the NELP provisions. Imported LNG is priced as per the pricing formula agreed between the LNG supplier and importer for long term supplies, and as per the spot price for spot purchases. Of course the gas transportation charges would be regulated by the Regulatory Board being setup under the PNGRB Act, 2006.

IMPORT DEPENDENCE AND ITS IMPACT

Presently, about 45 percent of primary commercial energy needs are met from oil and gas. Of this, over 70 percent of domestic oil consumption is imported mainly from Middle East. Gas imports started in 2004-05 and in 2005-06 about 19 percent of the gas consumption was met from imports. Import dependence is likely to increase considering low accretion to domestic oil and gas reserves. In fact, the case of India is not typical and several oil consuming countries face similar situation. It is expected that global oil dependence on OPEC will continue to rise with countries competing for scarce resources.

The import bill for crude oil over last few years is as under:

Table 1.2: Import Bill for Crude Oil					
Particulars3	**2002-03**	**2003-04**	**2004-05**	**2005-06 (P)**	**2006-07 (April-Sep)**
Quantity in MMT	**82.0**	**90.4**	**95.9**	**99.4**	**53.6**
Value **$ Billion** **Rs Crore**	**15.8**	**18.3**	**26.0**	**38.8**	**25.2**
Average Price	**26.22**	**27.56**	**36.99**	**53.21**	**64.03**
Increase over 02-03 **In $/bbl** **In $ Billion**		**1.34** **2.5** **7,333**	**10.77** **10.2** **40,808**	**26.99** **23.0** **95,507**	

The country has spent foreign exchange to the tune of about $ 39 billion in 2005-06 towards the import of crude oil. The projected outgo of foreign exchange on account of import bill of Crude Oil in 2006-07 will remain high. The crude oil payments are in fact more than double for every barrel of crude in 2005-06 over 2002-03. This is a high price to pay for our dependence. Unfortunately, even in the future this position does not appear to improve. Given our track record in domestic E&P, our situation is likely to deteriorate.

Oil price vulnerability may affect GDP growth and has the potential to disrupt future development. Obviously India needs to shift focus from short-term management of energy requirements and pricing to long-term energy policy in light of core objectives indicated above and particularly in light of recent price spikes in the international oil markets. The challenge then is to ensure supply of energy at affordable price within available resources. Policy direction and intervention need to reorient the approach to match circumstances.

INDUSTRY STRUCTURE

Economic theory suggests that larger the number of companies operating in a sector, the more competitive it is and greater the productivity gains. Though at the same time economists have difficulty in finding perfectly competitive markets and particularly so in oil and gas. This is so because oil is intertwined with national interests and energy is recognized as fundamental for economies to function. In fact it is easier to find regulation and control in oil sector more so in the developing countries.

Given the nature of oil & gas, the current price scenario and future projections reveal that oil will increasingly be concentrated in hands of few nations, it appears, that there could be mounting resistance in moving towards a free market as visualized above. One of the biggest hurdles that India faces today is a lack of political consensus on free pricing of sensitive petroleum products. Any approach

that does not recognize the geopolitical nature of oil and the current domestic level of consensus would eventually fail.

At the same time, companies under the state dominate the oil industry in the country today. These companies follow government policies and directions and are accountable to the parliament. Besides, the C&AG (Comptroller and Auditor General) verifies their books of accounts and CVC oversees their commercial transactions. The present pricing structure is determined by the Government policy. Even if one argues that the state is operating a monopoly, it would be a public monopoly with all the attendant controls and accountability in place.

Competition in Indian markets can come if the state cedes its ground to other players. As privatization of Navratnas is not an option, reduction in PSU market share would have to happen organically, which could take some time, provided there is strong consensus on free pricing of sensitive petroleum products, which fully translates in the market place.

There is also a need to recognize that competition is a tool to improve efficiency and service standards but not an end in itself. The objective could be still achieved, within the present constraints.

In the oil sector currently there are mainly four companies in the marketing of products namely IOC, BPC, HPC and RIL besides players like Essar and Shell. The Herfindahl-Hirschman Index (HHI), which is square of the market share of the companies, for India (see note at 13.6 Annexure – IV) with the existing companies is higher than the desired number of HHI (range 1000-1800). However, with the pricing becoming free the market share will align itself in some desired ratios, which is expected to bring HHI to a reasonable level. Most competitive markets have five strong players. Thus, the current structure of the oil sector could continue. In suitable environment, the current structure will deliver a competitive market. This could be reviewed at the time of appraisal of the XI Plan.

In addition, the Government could do the following to achieve higher efficiency and service standards:

AT THE NATIONAL LEVEL

ƒ Encourage exports from the country compelling refineries to compete worldwide, meet global standards and meet requisite quality specifications.

ƒ Create a domestic petroleum product market through a commodity exchange.

ƒ Amalgamate individual state markets in one nation wide market with unified state taxes, remove state tax anomalies, provide level playing field to domestic production vis-à-vis direct imports (which can be imported without state taxes), and introduce a uniform VAT which provides full set-off for local levies such as octroi and entry tax.

AT THE CORPORATE LEVEL

ƒ Benchmark operation with world standards, the top refineries and make suitable improvements.

ƒ Ensure inter-PSU competition, particularly at the retail level. It could be contended that this action would lead to duplication of assets. But then competition always does that, for instance say the airline industry where infrastructure has been duplicated. Duplication of assets is a natural corollary to competition.

ƒ Exponential expansion of e-commerce transactions, which promotes competition and enhances welfare by reducing transaction and search costs.