Chapter III
India's Dependence on Oil: The Oil Imports Strategies

Energy is security, deficiencies in this critical strategic sector compromise national security. The major issues in this Indian energy sector are the absence of an integrated long-term energy policy; inefficiency in energy supply and utilization; an unsustainable energy mix; acute scarcity of development capital; a lack of rational energy pricing; insufficient environmental considerations combined with demonstrable sectoral changes which are in line with reforms in the economic, industrial and investment polices of the government. These issues are all critically interdependent.¹

In the energy sector the overriding need continues to be for the enunciation of a long-term strategy, leading to the adoption of an overall energy policy; a policy that is marked by an optimum economic utilization of the nations resources; is 'user-friendly' and duly accounts for the nations special needs; is conscious of the unbearable consequences of a shortage of capital; a policy which combines growth in the energy sector with conservation; is uniform in its application throughout the country; is environmentally conscious so as to sustain development; and which addresses itself simultaneously to correcting the existing imbalance and preparing for the first decade of the twenty-first century.

Table 3.1: Proven Energy Reserves

<table>
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<tr>
<th>Energy source</th>
<th>Unit</th>
<th>India</th>
<th>World of the world</th>
<th>India as %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>(bmt)</td>
<td>64.9</td>
<td>1,078.1</td>
<td>6%</td>
</tr>
<tr>
<td>Oil</td>
<td>(bbb)</td>
<td>5.87</td>
<td>1,000.9</td>
<td>0.59%</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>(tem)</td>
<td>0.735</td>
<td>124.0</td>
<td>0.59%</td>
</tr>
<tr>
<td>Hydropower</td>
<td>(mw)</td>
<td>94,000</td>
<td>n.a.</td>
<td></td>
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</table>

Source: Singh, Jaswant. Defending India. 1999, p.279

Table 3.1 reveals that proven reserves of hydrocarbons are small, accounting for less than 0.6% of the global reserves. India is relatively rich in terms of coal and hydropower, but their exploitation is constrained by factors such as poor quality of coal, environmental concerns, and interstate water disputes in case of hydropower and non-availability of financial resources. The primary sources of energy available are thus coal, oil, natural gas, hydro and nuclear power. Even though coal dominates,

persistent shortages of coal and power supplies during the recent past have led to substantial increases in the consumption of petroleum products largely as swing fuels. This can be attributed to the relative ease in importing oil and petroleum products, even if at difficult economic costs. Natural gas is a relatively new entrant in India's energy sector and could make significant contribution as a source of fuel and feedstock in a number of sectors. The issues which must be examined by the political military leadership of India are the potential for energy independence through development of India's coal reserves; a sound and sustainable development of its hydel potential, and thereafter, an energy strategy based on natural gas, the potential and the dimensions of which can be gauged by examining the Increasingly, what was earlier treated as an obstacle to smooth extraction of oil is now being employed as an additional energy source.

There is another area, atomic energy as a source of power. India can simply not leave or even neglect its development. What is needed is for the political military leadership of the country to separate the two strands: the entirely military from the purely peaceful. The current posture of uncertainty no longer suffices. On the dissimilar energy security has also suffered. This is best explained by a report of the Indian Parliament's Standing Committee on Energy, for the period 1995-96, on “Nuclear Power Programme”, of which it conducted an evaluation. This short report merits attention. It establishes as a finding that “most inexplicably the stated objective of attaining 10,000 Mw of nuclear power by 2000 AD has been neglected”. The current production is just about 10% of this goal and unless more investment takes place, this is the level at which it is likely to stay. But much more important are the views expressed by an expert, N. Srinivasan, that “in the absence of a committed continuous programme, the technology built under heavy probability over four decades will be permanently lost”. This would be a serious national loss, for which the political leadership alone would be responsible. Post Cold War Asia is in geopolitical alteration. The geopolitics of energy may be returning, once again, to the core of international relations in our region. Energy is already an important factor shaping the security dynamics in the Eurasian landmass, and could help redefine the relations among the Great Powers the United States, Russia, China and their alliances within our region. It could significantly reorder the balance of power in Eurasia and the world as a whole. Oil is, possibly at the heart of the ongoing instability in the Arabian Peninsula and the second “Great Game” to exercise dominance in Central Asia and the Caucasus. The political developments in both the regions are likely to have a significant bearing on the foreign relations of most nations of the region, including India. A major component of this emerging political situation is competition for a secure energy supply and related tension regarding conflicting claims to potentially oil rich sources including the seabed; and of course the protection of vital sea-lanes. In an increasingly energy scarce world, such issues will become the national security concerns. If the major powers in the region fail to develop cooperative multilateral
arrangements in the energy sector, competition over scarce resources could become the channel for regional conflict.\(^2\)

Recently, Ministry of Petroleum will be, or rather should be, prioritizing his policy agenda for the hydrocarbon sector. The facilitator should be the acknowledgement that the short-to-medium-term initiatives on hydrocarbons must be framed within the context of the longer-term energy and ecological imperatives. There is a positive correlation between economic growth, energy demand, and environment pressures. The challenge is to break this nexus. It is to support increasing affluence without causing ecological damage. It is to meet energy demand and at the same time halt greenhouse gas emissions and stabilize atmospheric carbon levels around the generally acceptable level of 550 ppm. This challenge can be met only if the Ministry of Petroleum & Natural Gas works with his counterparts in power, coal and non-conventional energy to address in particular questions such as how oil can be replaced as a transportation fuel. What steps must government takes, to drive the cost reduction of renewable energy sources. And how can technologies be developed that provide affordable and reachable renewable energy. The underlying long-term policy goal of such interministerial negotiations should be to reduce India’s dependence on fossil fuels.

Against this strategic backdrop, our leading short-to-medium-term concern has to be oil supply security. This is not just a question of physical access. It is also a matter of financial certainty. Today we face not just a growing import burden but also the uncertainty of oil price instability. The government has already initiated three steps to tackle these concerns. These should be continued, subject to the entry conditions of sound commercial logic. One, to harness our indigenous hydrocarbon reserves through the continued offering of attractive acreage for exploration on flexible and internationally competitive terms to Indian and overseas companies. Second, to maximize that value of already discovered reserves through the application of advanced exploration and drilling technology and innovative low cost development techniques. Third, to build up the portfolio of equity crude overseas through exploration Sakhalin and/or acquisition of producing fields Angola, Sudan.

In addition, given the fact that West Asian producers, and in particular Saudi Arabia, will remain the dominant exporters of oil, we should consider developing stronger bilateral ties with these countries. The peg on which such ties can be hung is our need for stable and secure crude supplies on the one hand and the crude producers requirement for significant and assured market outlets on the other. The precise shape of such ties may not be easy to develop, given the political and commercial sensitivities but if successfully managed they could enlarge the oil supply security. Ministry of Petroleum & Natural Gas has reservations about the economics of creating a strategic oil reserves. The expenditure on creating the storage and in carrying the inventory will not be insignificant and Ministry

\(^2\) Ibid, no.1. p.279.
ask whether in our connected world, and given the scarcity of our finances, we should take out such an expensive insurance.

The practice of gas must be accelerated. Gas is a relatively clean fuel and offers operational efficiency and cost savings. Except in circumstances of extended low prices, it is competitive against liquid fuels and coal. The objective of gas policy must be threefold: to create a competitive gas market such that competent players are attracted to it; to ensure a level playing field; and to see that customers get best value for their money. Towards this end, the government should shepherd policies that ensure that if GAIL is to be the monopoly transporter of gas, it should have no involvement in production or marketing. Else, there will be conflicts of interests that will ultimately be unfavorable to the industry and the consumers. The policy should ensure that all gas-marketing entities are granted equal access to existing and newly built pipeline infrastructure. Pipeline tariffs must be set on principles that balance and protect the interests of the producers and the consumers but assure the transportation company a fair return on its investment. And all facilities must be operated to the highest technical, safety and environmental standards. A Petroleum Regulatory Bill has been drafted. It should be finalized with these issues in mind and then legislated at the earliest possible opportunity.

The potential demand for gas is huge but it has been controlled somewhat by the unwillingness of secure customers in the power and fertilizer industry to accept the higher bands for imported LNG and newly discovered indigenous gas. The government central and state could ease the transition to this higher band by lowering the sales tax and by granting the industry infrastructure status. The downstream refining and marketing segment has been gradually deregulated. However, other than Reliance, which has approximately 40% of the indigenous refinery capacity, the private sector remains a peripheral player. This is partly because of the difficulty of breaking into a market as complex as ours, partly because of the inherent strengths of the present public sector companies. And partly because strategic disinvestments of HPCL has been stalled and also because the barriers to entry still remain.

The government may not wish to surface politically sensitive issues like strategic disinvestments but he should remove the remaining barrier to entry. The Rs 2,000 core investment hurdle for a retail-marketing license could be abolished. And either abolishing the subsidies given to the PSUs or granting the same support to credible private companies, in particular those that have invested in LPG infrastructure should level the playing field for private LPG marketers. The underlying objective should to reap the efficiency and quality gains that come from a genuinely competitive market environment. In short, hydrocarbon policy today must lay the foundation for energy and ecological
security tomorrow. Oil supplies are a current imperative. Inter-fuel substitution in favour of gas and renewables must, however, be the sustainable priority.³

For example, the recent decision by China to establish a Strategic Petroleum Reserves (SPR) at an initial cost of $725 million is an acknowledgement of its huge and growing energy liability. The SPR, designed to hold 75 days reserves, is too be set up in four locations. The China State Council has approved the blueprint and authorized construction of the first phase in a costal location south of Shanghai. The entire stockpiling operation is expected to be completed by 2010. This decision puts China in the same league as the United States, the European Union, Japan and South Korea all of them big energy importers that have their own strategic petroleum stockpiles to insure against potential supply disruptions. It also isolates India as the only other major energy importer without a safeguard. Considering that there have been more than 20 instances of oil supply disruptions of varying duration and intensity in the last fifty years, the importance of strategic reserves for a country heavily dependent on imported oil can hardly be overstated.

An SPR is a supply of crude and petroleum products held as emergency reserves by an energy importing country. While crude is usually stored in naturally obtaining undersea salt caverns or in empty oil wells past their productive life, petroleum products are stored in overland tanking facilities expressly constructed for the purpose. Countries without natural salt caverns construct overland tank farms for storage crude as well. It is useful to store crude in locations close to refineries whereas petroleum products may be stored near consuming centers. Oil from an SPR is released to compensate for physical supply disruptions or even to moderate the impact of price spikes and fluctuations. After all, price volatility is as acute a concern for energy importers as the physical availability of oil. The SPR, therefore, can be a useful physical as well as financial tool to deal with energy insecurity. When it comes to energy insecurity, India and China have many parallels. Both are developing economies with huge populations and very low per capita energy consumption.

It is, therefore, predictable that their development route should entail quantum leaps in energy consumption. Both have abundant coal reserves China is gifted with better quality coal than India and as such, coal constitutes the main fuel in the energy baskets of the two countries. However, the share of oil is increasing, thanks mainly to policies that have promoted motorized transportation in both these Asian countries. Besides, India and China have ratified the Kyoto Protocol and hence are committed to pursuing a growth example that is environment friendly, necessitating a move away from polluting coal. Although the Chinese economy is not as energy intensive as India’s its healthy growth in the last decades and a half has aggravated dependence on imported oil. China’s Ministry of Land and Natural resources reports that the country’s oil consumption has been growing at an average rate of 5.7% during

the last decade. In the next 15 years, it is expected to grow even faster. In the last two decades, India’s energy consumption grown outpaced its GDP growth and the trend is likely to continue till 2020.

Oil and, to some extent, natural gas will feature highly in this growth pattern. But then, the parallel does not stretch much further. India has been an oil importer for over fifty years now whereas China became one only in 1993. In absolute terms, the two countries import almost similar quantities of crude but then, India’s import dependence is far more acute than China’s. While imported oil constitutes just about one out of every three barrels China consumes, India imports three out of every four barrels of crude it needs, indicating the very serious degree of our imports liability. Physical quantities apart, India’s energy imports amounting to a little over $17 billion a year constitutes the single largest item in the total import bill. Oil accounts for a third of the value of all items imported by India and it pre-empt 40% of our export earnings whereas for China, energy imports accounts for just about 6% of its export earnings. At the current levels of energy intensity of its economy, India’s import dependence will be near total by 2020 whereas for China, at least one out of every five barrels consumed would still be domestically produced even in 2020.

Oil supply disruptions could, therefore, prove to be a far more serious threat for India than they would be for China. Ever since it became a net oil importer, energy security has been a supreme concern for Beijing. Its leadership has been acutely conscious of the country’s energy weakness. In the last 10 years, energy security concerns have informed and dominated China’s diplomatic, strategic, political, commercial and economic measures. The Chinese position on Iraq in the United Nations Security Council debates has been consistent with its own energy interests in Iraq. Chinese leaders have used diplomacy as a tool to help their companies win oil concessions overseas. The China National Petroleum Corporation (CNPC) has acquired oil acreages/share-oil contracts in 21 countries around the world and in these efforts, it has been aided not a little by its leadership’s effective diplomacy. Trade and bilateral cooperation have been used to secure energy alliance especially in Africa which supplies a third of all the crude imported by China.

India lags far behind China in this regard although ONGC Videsh Limited has acquired oil and gas acreages in countries such as Myanmar, Sudan and Vietnam. China has also pursued diversification of oil supply sources, but with much less success. China has displayed farsightedness even when it comes to restructuring its oil industry to support it with the global market. It has cross assigned the assets of its two major national oil companies CNPC and Sinopec to create two vertically integrated oil companies large enough to take on multinationals while we in India talk of breaking up our national oil companies into smaller entities to facilitate their sell-off. Conscious of the strategic nature of the energy business, the Chinese government has managed to retain control over its national oil companies even as
it has succeeded in attracting foreign investments in its energy sector a complicated tight situation walk certainly, especially when it had to be done without falling foul of the mandate of the World Trade Organization.

For a few years now, India has also been actively considering setting up an SPR. The build up to the U.S. attack on Iraq last year had heightened fears of supply disruptions and exacerbated oil price instability, underscoring the need for an urgent emergency buffer. Currently our oil refineries have crude inventories of about 15 days and some product inventories the only safety net we have against any supply disruptions. Preliminary feasibility studies indicate that 15 days SPR stored in underground caverns will cost Rs. 1,225 crores in capital expenditure and Rs. 600 crores for annual maintenance. In order to ensure a small amount of security against supply disruptions, India would need 45 days reserves, which could mean an upfront cost of about Rs. 4,500 crores. Indian plans to set up an SPR have got stuck on the question of how it should be financed.

Countries that have set up SPRs have adopted a variety of financing mechanisms. While it is entirely government financed in the U.S. other countries have adopted a combination of government and industry funding to build their petroleum reserves. The Chinese government has decided to make a special fiscal allocation for the SPR and is contemplating issuing long-term treasuring bonds to raise funds for the purpose. The Indian government is discussing a cess on petroleum products to finance the venture, but considering the already huge levies in the present market price of petroleum products, is uncertain and correctly so to take the thrust. An imaginative option that is eminently feasible and relatively painless would be to set aside a portion of the proceeds of disinvestments of oil companies to fund the SPR. 4

Gas is pretty rarefied stuff but the natural gas industry cannot stand on thin air. But a large chunk of this industry finds itself treading precisely on this form of support, after the Supreme Court knocked off the bottom of the scaffolding holding up the industry still in the initial stages of construction. The center must take immediate remedial action. The government of Gujarat had notified a law, passed by the state legislature, to regulate the natural gas business in the state. 5

4 Sudha, Mahalingam, (The Hindu New Delhi, Tuesday, March 2, 2004).
Table 3.2: The Energy Roster

<table>
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<th>Energy source</th>
<th>Demand</th>
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<td></td>
<td>Unit</td>
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<td>Nuclear Power</td>
<td>BkWh</td>
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<td>Demand</td>
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MMT: Million metric tonnes
BCM: billion cubic meters
BkWh: Billion-kilo watt hour

Source: Tenth Five-Year Plan for Energy Sector.

Gujarat has a special affinity for gas, thanks to the location, in the state, of the starting point of the HBJ pipeline carrying gas all the way to Uttar Pradesh, and now of the country’s first liquefied natural gas terminal at Dahej. There are many takers in the state for gas both as fuel and feedstock. At present, an investment of around Rs. 1,300 crore has already been made in gas pipeline and other related infrastructure in the state by Gujarat State Petronet Ltd and British Gas subsidiary Gujarat Gas Company Ltd. The government of Gujarat has appointed state level public enterprise Gujarat State Petroleum Corporation as the nodal agency to give distribution license in the state. GAIL, Gujarat Gas and the Adani group have been given distribution rights in different parts of the state. The propriety of state level legislation on natural gas was not obvious to several agencies, including gas major GAIL. They convinced the central government to seek a clarification from the Supreme Court on this.
So the President of India sought the Supreme Court's opinion on the subject. The basis for confusion is in the Constitution itself. The Seventh Schedule to the Constitution lays out lists of subjects falling respectively under the Center, the State and concurrently under the Center and the States. In List 1, which specifies the Centers subjects, entry no 53 reads: regulation and development of oilfields and mineral oil resources; petroleum and petroleum products, other liquids and substances declared by parliament by law to be dangerously inflammable. At the same time, entry no 25 of List 2, which describes state subjects, reads as follows: Gas and gas works. It was on the strength of entry 25 of List 2 that Gujarat enacted its regulatory regulation on natural gas and gave distribution licenses within the state. The Supreme Court last month came up with the finding that notwithstanding entry 25 of List 2, natural gas is a petroleum product falling under the purview of the Centre and that States, therefore, have no competence to legislate on the subject.

The Center own legislative framework to regulate natural gas is a work in progress: the Petroleum Regulatory Board Bill was under Parliament's scrutiny and will now have to await the constitution of the 14th Lok Sabha to be passed into law. While a law, dating back to 1962, exists to permit acquisition of land for the purpose of laying petroleum product pipelines, the legal basis for the gas industry does not go beyond that. So what happens to the investments in the distribution infrastructure already made in Gujarat on the strength of the Gujarat law now found to be ultra vires of the Constitution. The issue was debated at length at a brainstorming session organized by Infraline Technologies on the subject recently. Several representatives of the natural gas industry from Gujarat and outside, as well as of the government, financial institutions, consultancy organization, law firms have their opinion. While there was consensus that the investments that have already been made and are in the pipeline should not be, allowed to be made infructuous, there was little agreement on the nature of desirable regulation of the natural gas sector.

Not surprisingly, state level gas companies tended to argue that regulation should be at the state level, rather than at the central level. An other opinion that received more support was for a regulatory regime that involved both central and state level agencies. India already has a model of such combined federal regulation in the power sector, where a central regulatory commission co-exists and operates within the parameters of policy laid down by the Centre. There is no reason why the same model should not be followed in the case of natural gas as well. While it is true that power is a concurrent subject under the Constitution and the Centre has little choice in the matter, it is absolutely not correct that, on a subject falling within the Centres domain, the states cannot be involved in regulation. A regulator becomes necessary for a sector for a variety of reasons that include limited competition and the possibility of frequent disputes calling for intervention by someone who is not party to the dispute.
That there can only be limited competition in the business of transmitting and distributing gas is fairly obvious although it is far from obvious that transmission of gas is a natural monopoly as the present draft natural gas policy holds. Further, it is only the underdeveloped nature of the gas industry that makes it difficult for most people to imagine a situation in which gas pipelines criss-cross a region, multiple suppliers competing to meet the multiple demands of numerous users. This would be a natural scenario once the full potential of gas availability from Central and West Asia materialize in India. There is no way a distant central regulator would be able to effectively monitor such a scenario. The regulatory regime necessary needs to have a state level arm. At the same time, regulation cannot be left entirely to individual states either. No state can, for example, be allowed to pre-empt for its own use a major portion of the gas produced at an LNG terminals happens to be located there. Nor can different pricing and distribution priorities be foisted on gas supplies as their pipelines traverse across state boundaries. Concurrent federal regulation is the way out. And the petroleum sector regulatory bill has to be suitably modified for the purpose.\(^6\)

India has very high-energy import dependence. India imports 70% of its crude oil requirement. The Government of India (GoI) is taking steps to enhance indigenous production currently 32 million tonnes and likely demand which is expected to reach 244 million tonnes in 2011 and 370 million tonnes in 2020-21. The demand for oil and natural gas, which together make up about 42% of the energy requirement, is likely to grow at the rate of 5.6% in the case of oil. The growth in consumption of natural gas is expected to increase from the current level of 65 MMSCMD to 231 MMSCMD in 2006-07 and would approximately be 391 MMSCMD by 2025, indicating that dependency mainly through imported Liquefied Natural Gas (LNG).\(^7\)

India is investing in infrastructure to meet the increase in natural gas requirements by expanding domestic pipeline capacity and building LNG import terminals and additional facilities to handle imports. LNG is considered a clean and environmentally friendly fuel. According to an estimate made by the (GoI), the demand for LNG is expected to increase greatly in the next couple of years. To narrow the gap between the demand and supply of LNG, the (Government of India) has also floated a new holding company, Petronet LNG Ltd. The company is expected to set up a number of gas terminals on the coastal areas to import and distribute LNG. The main players in India now in the LNG segment are Petronet LNG (Dahej & Kochi), Shell (Hazira), Unocal/Grasim (Ennore), Petronas (Kakinada) and British gas (Pipavav). Providing infrastructure status to LNG would ensure that developers of LNG projects could go in for project imports at concessional duty rates. Currently imports of LNG have been


\(^7\) See, Oil and Gas Market in India; www.uktradeinvest.gov.uk/oilandgas/India_upstream/profile/overview.shtml
put under Open General Licence (OGL) and countervailing duty (CVD) on import of LNG has been removed.

Natural gas supplies about 7% of India's energy demand. The MoP&NG expects the net production excluding technical flaring and captive consumption by producers of natural gas to plateau at around 25 BCM (68 MMSCMD) in 2001-02. Most of the increased demand, therefore, is expected to be met through imports. To meet future demand, India is pursuing additional long-term sources of natural gas, blocks. Major oil companies which participated in the bidding process included Shell, BP Amoco, Cairn Energy, Enron Oil & Gas, Hardy Petroleum, Occidental, BHP, Chevron and Premier Oil.

And there are several reasons to expect that oil prices will remain high, if not rise higher, at least through the summer of 2004. One major force that is currently imposing some strain on the global oil market is the increase in demand in China. Globally, the International Energy Agency (IEA) forecasts demand to reach a level of 80.2 million barrels per day (mb/d) which would involve an increase of 1.65 mb/d over the demand in 2003. On the supply side there are reasons to expect a tightening of the market as well. Firstly, production in Iraq, which has been projected to reach 2 mb/d by end December 2003, has now proved to be totally off the mark. Interestingly, military forces in Iraq themselves are consuming 0.4 million barrels of oil products per day. Combined with stagnant production in Iraq is the reduction in oil output has been taken place in the US, Norway and the UK. Further, the recent decision by OPEC to cut output, if implemented, would coincide with increased seasonal demand in the US with increased automobile usage.8

Some projections indicate that oil prices could go up to over $35 per barrel by August 2004. While drawing this picture it must be emphasized that oil prices projections even in the short-term challenge even the most progressive analysis. There is, for instance, the political dimension of global events and developments, which could reduce supply or on the other hand anger OPEC's, resolve to cut production even as the weakening dollar supports OPEC's interest in higher prices, because oil is priced in dollars. OPEC also sees the current situation as an opportunity to boost oil revenues, given the fact that several of its members need to make major investments. The world is going to consume a huge quantity of oil over the next 25 years. IEA projects oil consumption worldwide to increase from around 75 mb/d in the year 2000 to 120 mb/d in the year 2020. The bulk of the increase in supply for meeting this demand would come from the OPEC nations, particularly those located in West Asia. Their price behaviour at present would, therefore, be influenced greatly by this longer-term scenario.

As the OPEC oil and energy ministers gathered in Algiers in February for the 129th (Extraordinary) Meeting of the Conference, a number of commentators were predicting that the organization would maintain its production ceiling for the OPEC ten member countries unchanged at

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8 R.K. Pachauri, Director General TERI. Where are Oil Prices Headed? (The Economic Times, New Delhi. April 8, 2004).
24.5 million barrel/day. When the actual decision, therefore, was announced a cut of 1 mb/d to 23.5 mb/d, effectively from April 1, some of them expressed surprise and wondered if the cut was in fact necessary, given the recent firmness in oil. Although it is certainly true that prices have remained strong in recent months, this should not be misinterpreted as indicating that the market is insufficiently supplied with crude.

However, there are currently a number of other factors that must be taken into account which have contributed to the strengthening of the price, the most important of which can be summarized as follows. Firstly, commercial crude oil stocks in the US have recently fallen to their lowest level since 1975, dropping through the perceived lower minimum operating level (LOI) of 207 mb to 264 mb in early January. This has had optimistic effect on the market and no prices of oil. Secondly, markets continue to be affected by a variety of other factors, including excessive levels of speculation and the ongoing geopolitical uncertainties. Also of significance is the fall in the value of the dollar. It has weakened the purchasing power of oil exporting nations. Oil exporters cannot, of course, influence currency movements directly, but they can at least seek to minimize their effects by determined to maintain market stability. Finally, as is well known, the second quarter of the year is traditionally the weakest for oil demand.

The northern hemisphere winter has passed, and with it the peak in heating oil use, but the summer driving season, when gasoline demand is strongest, is not yet in full swing. Prompt action is therefore required in order to prevent excess supply building up in the second quarter and exerting downward pressure on prices. The various others factors outlined above, which lie outside OPEC’s sphere of influence, have contributed to keeping prices firm. Recently, India’s crude oil production rose marginally to 33.38 million tonnes in 2003-04 fiscal mainly due to increase in production by private firms. While state run Oil and Natural Gas Corporations crude output was almost stagnant at 26.06 million tonnes, private firms production rose 5.6% to 4.31 million tonnes as against 4.08 million tonnes in 2002-03, accordingly to the latest data released by Ministry of Petroleum & Natural Gas. Production of petroleum products was up 8.2 million tonnes to 121.76 million tonnes in 2003-04 as opposed to 112.55 million tonnes in the previous year. Public sector refinery output increased 9% to 89.42 million tonnes while private sector Reliance Industries production rose 5.9% to 32.34 million tonnes. RIL’s Jamnagar refinery operated at 113.5% of its capacity of 28 million tonnes while public sector refineries operated at 99.4% of their capacity. Natural gas production, however, fell 9.6% to 31,953 million cubic meters in 2003-04 as compared to 31,391 million cubic meters produced in the previous fiscal. ONGC gas output fell 16.2% to 17,805 million cubic meters.

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9 P. Yusgiantoro, President OPEC Conference. (The Economic Times, New Delhi, April 8, 2004).
OPEC's agreement to cut oil output by 1 million barrels a day will undoubtedly send shivers down the spine of various governments around the world. While oil prices in international markets, ironically, slipped on the announcement of the production cut, the signs, over a longer term, remain threatening for most economies. Over the short-term the analysts are not predicting any sharp rush in prices. Higher oil inventories in the US and an expected respite of demand in the lean months of April to June is not likely to put much pressure on oil prices. Further, many OPEC producers are already believed to be producing more than their official target production. Over the longer term though, prices are expected to rise. While appreciation in the value of the rupee will cushion the impact of the rise, India's import bill is sure to rise. It is estimated that the increase in the price of oil by $ 1 adds more than half a billion dollars to India's crude bill. The impact is not limited to this alone. Analysts also expect high oil prices to negatively impact the rate of growth in various economies. It has been estimated that growth in G-7 countries could be 0.3% lower in the coming months on account of high oil prices. This can only be bad news for a country hoping to 'feel good' in the years to come.

In the Indian context there is another factor to consider. Local retail prices fail to move global prices on account of the arbitrary policy implementation in the post-APM regime. Refiners suffer as politicians force them to subsidize consumers. The impact of this arbitrary regime also has a ripple effect on the shares of downstream oil companies. While the government can do little to check the rise of oil prices because of various factors outside its control, it can ensure that a political consensus is built for a transparent and fair system of oil pricing. This will benefit both consumers and refiners. That is what the dismantling of the APM regime was all about wasn't it.

The government's decision to set up strategic oil reserves of 5 million tonnes in addition to what the oil refining companies normally hold as crude inventories may seem like a prudent move. But a closer look shows it may not be so. Considering that India imports almost 70% of its requirement of crude oil, there is indeed reason for the country to be concerned about ensuring that oil supplies are not disrupted in times of crisis like the Iraq war. However, that does not necessarily mean that building a strategic reserve is the best way of going about the job. There are only four countries in the world the US, Japan, Israel and Germany where governments hold strategic oil reserves. Even these countries have often had second thoughts about the effectiveness of such reserves and the long-term trend has been towards reducing physical stocks rather than adding to them. Having foregone the option of building a strategic reserve all these years, the government should ask itself whether it really makes sense to commit such large sums of money to a project whose objectives might be more easily met through other methods. It is not as if the cost is small. To begin with, there is the estimated Rs. 1,600 crore to be put into building storage capacity. Then there would be the cost of buying 5 million tonnes of crude, which would be of the order of Rs. 4,500-5,000 crore. Finally, of course there would be the
costs of maintaining the reserves, though these are likely to be tiny in comparison with the sunk costs. And all this to yield a cushion of nearly 5 million tonnes, or about 15 days oil requirement.

In the modern world, with its sophisticated prevarication instruments, the purpose of reserves cannot be primarily to protect against price shocks. Most probably, therefore, they are addressing the possibility of an actual physical disruption of supplies. Quite apart from the fact that this is less likely today than in the past this contingency too could be better dealt with by diversifying source of supply across different parts of the globe.\textsuperscript{11} U.S. Energy major Unocal Corporation has finally decide to shelve its plans for building a $1.2 billion pipeline to evacuate gas from Bibiyana in Bangladesh to various U.S. markets in northern India. Unocal’s decision was apparently governed by the perception that it would not be politically feasible for any government in Dhaka to allow the sale of Bangladeshi gas to India in the foreseeable future. Unocal has cited the experience of the former Bolivian President, Gonzalo Sanchez de Lozada who was overthrown for, among other reasons, exporting the countries natural resources to support this perception. This underlines once again the impact that geopolitics can have on what should be routine business decisions. That, in turn, underlines the need for India to improve relations with its neighbors. True, there are other sources of gas, like Myanmar, and the failure of the Bangladesh venture to come through is not the end of the world. Domestic availability of gas too may improve considerably. Nevertheless, Unocal’s decision does mean that a relatively low cost and proximate source of supply now seems more distant.

Historically, the Indian economy has been highly dependent on the agricultural sector, which has accounted for more than 50% of the national income. Following World War II the Indian government, to decrease its dependence on the agriculture sector, began to pay special attention to the industrial sector. This sector has grown twice as fast as the agricultural sector, or 5% annually, resulting in a rapid increase in petroleum consumption. The increase in petroleum consumption has been accompanied by a rapid rise in oil imports, with a subsequent negative impact on India’s balance of payments. India today spends 75% of its export earnings to pay for crude oil. The history of the Indian oil industry has been one of continued attempts to reduce the impact of this oil import bill.

The beginnings of the Indian petroleum industry date back to 1889, when the Assam Oil Company (later a subsidiary of the Burmah Oil Company) discovered the first major oil field in India. The same year the Assam Oil Company constructed, in Digboi, the country’s refinery, which had a capacity of 8,000 b/d. Interest in India as a market for oil products goes back to the late nineteenth century, when both Standard Oil Trust and the Russian exported kerosene to India. However, the size of the Indian oil market, and thus the need for petroleum products, did not reach a significant level until the years after the nation’s independence in 1947. In an effort to decrease the country’s dependence on

\textsuperscript{11} See “Costly Solution; Strategic Oil Reserves Not the Best Answer”. (The Economic Times, New Delhi. April 10, 2004).
agriculture, the government of India inaugurated its First Five Year Plan in 1950. During this first plan (1951-55), special attention was paid to the industrial sector, whose annual growth rate reached 8%. The rapid growth in this sector caused major structural changes in the Indian economy. One important change was the rise in demand for energy, which significantly enhanced the role of the energy sector in the economy. During the early years of the First Five Year Plan, consumption of refined oil products rose rapidly. Since the only local refinery at the time was the small refinery owned by Assam, which, accounted for 10 to 15% of the local market, the bulk of local demand had to be satisfied through imports. This task was carried out by three multinational oil companies (MNOCs), which accounted for sales of over 80% of the total petroleum products in India in the early 1950s. Burmah-Shell, an equally owned subsidiary of Burmah Oil Company and Shell Transport and Trading, was the most influential of the foreign oil companies present in India, accounting for 50% of the market. The other two major companies were Standard Vacuum Oil Company (whose Indian operations later were owned by Exxon) and Caltex the former an equally owned subsidiary of Standard Oil of New Jersey and Mobil, and the latter an equally owned subsidiary of Standard Oil Company of California and Texaco. These MNOCs were the only companies that had access to large quantities of refined products and the necessary marketing facilities to distribute these products in India.

The increased demand for petroleum products led to substantial concern about India’s balance of payments. In 1954, India imported $200 million worth of oil, which accounted for 15% of its total import bill. Because less foreign exchange was needed to import crude oil than to import refined products, the Indian government put pressure on the three companies to develop their local refineries. The three large MNOCs groups acquiesced; in 1954, Standard Vacuum built a refinery with a capacity of 25,000 b/d; in 1954 Burmah-Shell built a refinery with a capacity of 40,000 b/d and in 1957, Caltex built a refinery with a capacity of 14,000 b/d.

For several major reasons the MNOCs were not opposed to the government’s demand with regard to the construction of refineries. First, they realized that because of the rapid growth in oil consumption in India and the resulting drainage of the nation’s foreign exchange, the economy was weakened and their markets were in danger. Second, they tended to control their profits through the price of their crude; thus building local refineries their profits through the price of their crude; thus building local refineries would not harm them financially. Furthermore, the economics of transporting crude were becoming more attractive than those of transporting refined products. Finally, in the early 1950s the MNOCs were confronted with nationalistic tendencies in producing nations especially Iran and were considering to refining away from crude producing centers.
To encourage the MNOCs to construct local refineries the Indian government and the companies negotiated the refinery agreements of 1951 and 1953. These agreements stated that (a) each company had the right to import and refine oil from its own sources, (b) the government was prohibited from placing a duty on crude oil, and (c) the companies not be nationalized for twenty-five years after they had begun operations. In India 1953 was also an important year for exploration. In that year a second oil field was discovered by the Assam Oil Company, at Nahorkatiya. In addition, the Indian government entered into a joint exploration effort with Standard Vacuum. Under this agreement all Standard Vacuum’s loses over and above those of the government were deductible against the MNOCs marketing income. This exploration, which lasted for seven years, was unsuccessful, and in 1960 the project was terminated after a total cost of $17 million was incurred.

The increasing rate of industrialization during the early 1950s resulted in a rise in the demand for energy. In 1954 the petroleum import bill constituted 15% of India’s total imports. This tall demand for energy was the major cause of the government’s closer scrutiny of its national energy policy. The government identified two alternative courses of action for purposes of satisfying the local demand. The first option was to increase imports and utilize the expertise and facilities of the multinational oil companies. Such an action would have had a severe negative impact on India’s balance of payments, however. In addition, it would have increased the nation’s dependence on foreign oil companies, which was politically unfavorable. The second option was to encourage local development, particularly, crude oil exploration. This option did not entail the problems associated with the first option; however, at that time it was not feasible. The development of an oil industry required expertise and capital; neither was readily available to India.

Because of the problems of each alternative, it was decided that both alternatives should be pursued. Such action was appealing because it would enable the government to fulfill its energy goals. In the short run the local demand would continue to be satisfied through the existing facilities of the MNOCs. At the same time the Indian government would begin to undertake the actions necessary for gradual development of an integrated oil industry. In so doing the government would attempt to take maximum advantage of the expertise, capital and other resources of the MNOCs. As its expertise and capabilities increased in this area, the government would reduce the role of the MNOCs while enhancing its own involvement in the industry.

With the start of the Second Five Year Plan in 1955, the Indian government increased its pressure on the MNOCs for two reasons. First, the increasing growth in imports had led to a further deterioration of India’s foreign exchange reserves. Between 1955 and 1960 imports rose from $1.4 billion to $2.3 billion, resulting in a decline in India’s foreign exchange and gold holdings from $1.9
billion to $0.7 billion.\textsuperscript{12} Rising petroleum import costs aggravated this. In 1954, India's oil import bill amounted to $200 million, or 15% of its total imports. It was therefore important that India use the cheapest crude available. The Soviet Union, with excess crude available for export, offered petroleum to India at reduced prices. The government, facing severe balance of payment difficulties, requested that the MNOCs use this cheaper crude in their refineries. The MNOCs declined the suggestion. This issue was to become a source of conflict again in 1960, when the Soviet Union offered India some 18 million barrels of crude per year at reduced prices allegedly 13% below world prices. This amount represented 50% of India's crude oil imports and would have saved it $5 million per year in foreign exchange.

Second, the desire by a broad base of political groups within the government to promote and strengthen indigenous control of the economy led to the demand that the MNOCs accept local equity participation in their Indian facilities. The government had been exerting such pressure since the construction of refineries in the early 1950s. The MNOCs however, feared that agreement would reduce their profitability and cause conflict over price and source of imported crude. Finally, as a consequence of the increasing pressure, Standard Vacuum agreed to issue $1.6 million of preferred stock to the Indian Public. Preferred stockholder were simply offered a fixed return on their investment and did not participate in the actual operation or profitability of the firm. The other companies refused to pay attention to the government demands.

Along with its indirect efforts to change the oil industry, the government increased its direct involvement. The government's first major oil exploration endeavor was the result of a 1955 tour by an Indian delegation was also responsible for determining source of aid for the development of the Indian oil industry. As a result of the recommendations of this tour, the Indian Oil and Natural Gas Commission (ONGC), which is 100% publicity owned, was formed in 1956. In addition, a group of Soviet and Western oil experts were brought to India to study and determine the prospects for the development of a fully integrated Indian oil industry. Soon, as a consequence of the work of the Soviet experts, the Indian Government undertook its first oil exploration.

During the Second Five-Year Plan (1955-60), of a total of twenty-six wells drilled, four discoveries were made by Indian and Soviet technicians, at Cambay (1965-57), Ankleshwar (1960), and Kalol and Rudrasager (1960-1961). The ONGC was fully responsible for the production of these wells. Exploration was continuing in the private sector as well. In 1956, Assam Oil Company discovered another major field at Moran. In 1958, Burmah Oil Company (owner of Assam Oil) and the Indian government set up a joint venture called Oil India Limited (OIL) to produce and explore in the proven areas of Nahorkatiya and Moran. The Indian government received a one-third interest in this activity.

\textsuperscript{12} Michael Tanzer, \textit{The Political Economy of International Oil and the Underdeveloped Countries}, (Boston: Beacon Press, 1969), p.170
Oil exploration activities were quite useful, and substantial additional petroleum finds were made. By 1961 the government equity in Oil was increased to 50% in return for concessions to additional surrounding areas and outlets for this new crude. During the 1955-1960 period, prior to these finds, the only exploration activity undertaken by the MNOCs in India was that of Standard Vacuum, which, is already, proved to be unsuccessful.

The Indian government spent some $400 million on exploration and production between 1956 and 1966, pursuing this diverse strategy of exploring for crude oil. Whereas Standard Vacuum exploration activity was unsuccessful, ONGC’s exploration activity, with the assistance of eastern bloc technicians, had a return on India’s investment (DCF) of 9 to 14% and the Burmah Oil Company joint venture OIL had a return on India’s investment of 13 to 18%. Toward the end of the Second Five Year Plan the Indian government was confronted with a difficult problem. The rising demand for oil in India could not be met by local demand. The savings brought about by importing crude, as opposed to refined, oil products were negligible when compared to the total cost increase in petroleum products. In mid-1960 the Soviet Union announced that it was ready to offer large quantities of low priced crude oil at 25 cents less per barrel than that of the MNOCs to India on a barter basis. This offer was extremely attractive to the Indian because the barter arrangement would result in annual foreign exchange savings of $80 million. For the arrangement to work, however, the MNOCs had to agree to handle the Soviet crude as a substitute to their own, and all three companies refused to do so. The MNOCs’ refusal to handle Soviet oil exacerbated the government’s rivalry toward them. Leftist factions in the Indian government pressured the central government to nationalize the MNOCs, but the government refused. Instead, the government increased its control of and participation in the oil industry. Groundwork had already been laid for this increase in 1959, with the government’s establishment of the Indian Oil Company. In addition, the government decided to (1) investigate the pricing policies of the MNOCs (in 1960 a Damle committee was appointed for this purpose),13 (2) provide increased support for an integrated state oil industry that could handle the Soviet products, with government control of exploration, building refineries, marketing, and distribution; (3) refuse to allow the expansion of existing refineries or the building of new refineries by the MNOCs; and (4) seek to bring newcomers into the oil industry, ranging from US independents, such as Phillips Petroleum, to state-owned companies, such as ENI.

To further minimize its dependence on these international companies the Indian government decided to develop its own indigenous refining facilities. To do so, however, India had to seek both

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financial and technical assistance. With the help of the Soviet Union and Rumania, the government developed two publicity owned refineries in 1962. These refineries were located in the eastern part of India, at Nunmati and Barauni, and they were to process the crude produced at OIL’s fields. Shortly after the construction of these refineries Soviet aided government exploration required the construction of a third refinery in Western India, at Koyali to process crude oil found in that region. Although the government refinery program had added significantly to aggregate refined product capacity and had resulted in a decline in dependence on imported petroleum products, its short-term effect was not significant because of the long lead time necessary to implement the construction and to bring the refineries on stream once the agreement were signed. In 1961, as a short-term solution for the shortage of refined oil products, the government permitted the established MNOCs to expand their refinery capacity. In 1962, subsequent to the Sino-India border war, similar permission was granted. In the following years, however, efforts by the MNOCs to acquire similar government permission were unsuccessful.

Also in 1962 the government entered into the first joint refinery venture with the private sector to construct a refinery in Cochin in the state of Kerala. Ownership in this refinery was as follow: Phillips Petroleum Company, 25% the Indian government, 51% and the Indian public, 24%. A year later (1963) the government entered into another joint venture with the private sector. This refinery, constructed in Madras, was to be owned by the Indian government (51%), the National Iranian Oil Company (NIOC) and the American International Oil Company (Amoco), 24%, and the Indian public, 25%. The government continued to increase its participation in India’s refinery operations. By the time the Madras refinery came on stream in 1969, the government had increased its share at the expense of private Indian interests from 51% to 74%. NIOC and Amoco held the remaining 26%. A few refineries were constructed in 1971 at Haldia in the state of West Bengal with the aid of the governments of France and Rumania. This refinery was 100% Indian owned.

The output of these refineries was marketed by the Indian Oil Company (IOC), established by the government in 1959 with this purpose in mind. In 1964 this company merged with the public refining company to form the Indian Oil Corporation, which was to control all downstream operations in the public sector of the Indian petroleum industry. Indian Oil Corporations marketing responsibilities soon increased as it acquired a virtual monopoly of all product imports and the output of all public owned and joint-venture refineries. A 1968 law that prohibited the private sector marketing companies

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14 Tanzer, Political Economy of International Oil, pp.208-209.
from expanding their existing units or increasing the number of their filling stations ensured the dominance of this government owned agency in the Indian oil market.\textsuperscript{16}

Although the government activity discouraged an even prevented the MNOCs from increasing their share of the refining and marketing sectors, its attitude regarding exploration was quite different. Throughout the 1950s and 1960s the government continuously encouraged the MNOCs to undertake exploration in India, but to no benefit. There were several reasons for this failure. First, the Indian government requested that the MNOCs invest their own capital for exploration purposes, without allowing these companies to deduct their losses although this permission was granted to Standard Vacuum in the late 1950s. Second, the onshore areas were not perceived as oil rich, with the exception of the areas that were allocated to ONGC. Third, the MNOCs had less reason to spend vast sums of money on exploration when they already had access to their own cheaper crude. The discovery of crude in India would be to the nation’s dependence on MNOC crude. Because crude imports accounted for most of the profits of the MNOCs, there were no reasons for them to attempt to reduce the importation of crude. Finally, in 1967, the government succeeded in persuading Ashland Oil refining Company to undertake oil exploration in India. Ashland was to commence offshore exploration as a joint venture with the ONGC as well as several other US independents. These exploration activities were unsuccessful.

India’s continual emphasis on industrialization to diversify the economy was producing some unforeseen and unwelcome results. Between 1953-54 and 1975-76 total energy consumption in India grew at an average annual rate of 3.6%. Demand for petroleum products grew at more than double the growth rate of GDP until the OPEC oil price hike in 1973, after which the domestic price of petroleum products rose in real terms and the rate of growth of demand stabilized somewhat. The growth in consumption, coupled with the rising cost of importing crude, was again hurting India’s balance of trade, which was running a deficit. India’s dependence on imported crude for two-thirds of its total petroleum demand made the impact of the 1973-74 OPEC oil increases particularly painful. The government therefore began to evaluate its petroleum prices.

The government did not want to cut back its industrialization plans, but it did attempt to reduce its dependence on foreign crude. Early in 1973 the government announced that it was opening up nine offshore oil and natural gas areas, one of which was set aside for development by domestic interests; 100,000 mi\textsuperscript{2} of India’s continental shelf were opened to foreign companies. These companies would be allowed to collaborate with ONGC. If the companies could get back, their investment operating cost and profit in crude. Under the government’s term, however, ONGC had first claim to any commercial oil find. Although the government sent out invitations to forty companies, British Petroleum was the only

major oil company to reply. ONGC did; however, award offshore production sharing exploration contracts to three smaller oil companies. (1) The Natomas Group (Natomas, Carlsberg, Lone Star Gas, and Crown Central Petroleum) leased the Bengal-Orissa basin. ONGC owned 15% equity with an option to increase it to 25% if commercial oil was discovered. (2) The reading Bates Group Reading and Bates, Superior Oil, and Tarra Resources, Incorporated leased the Kutch basin. ONGC had a 10% equity option. (3) Asamera Oil (Asamera Oil, Canadian Superior Oil, ad North Canadian Oil) drilled in the Cauvery offshore area. ONGC owned 35% with an option to increase its equity to 50%. By 1977 no commercial petroleum had been found and each group abandoned its efforts.

Subsequent to these unsuccessful efforts the government decided to hire foreign companies as drilling contractors. ONGC thus abandoned its production-sharing concept and undertook service contracts with CFP of France and Geoman (a subsidiary of Gulf Oil). These companies were involved in the development plan of the successful Bombay High region. In addition, ONGC signed a protocol with the Soviet Union for exploration in the Tripura and West Bengal areas. Thus, with the exception of Oil India and Chemo Complex (Hungary), which jointly drilled a well onshore in 1978, and the above production sharing contracts, ONGC has conducted all exploration in India in the past ten years.

Onshore, ONGC accelerated its exploration effort in 1979. As of March 1979 thirty-two land rigs were in operation for exploration and development and some seventy-five wells were drilled in 1978-79. Current plans call for about one hundred wells per year by 1982-83. Whereas most of the onshore operations have so far been confined to relatively shallow drilling, ONGC is now in the process of launching a deep-drilling program that would require the acquisition of new, more sophisticated rigs. Failing to attract the MNOCs to conduct new exploration, the government increased its share of both refining and marketing. In March 1974 the Indian government acquired 74% of the Esso (later Exxon) refining and marketing operations. The remaining 26% was to be taken over by the government by 1981. The resultant new organization was called the Hindustan Petroleum Corporation. Esso would remain the sole crude with others until 1981. Subsequent to this agreement, the government initiated similar discussions with Burmah-Shell and Caltex. In 1976 the government took steps to acquire the refinery and marketing operations of Caltex. By September 1981 the government had completed its takeover of Burmah-Shell's 50% share in Oil India Limited and all the assets of Assam Oil. The only remaining foreign private-oil interests in India include the Cochin refinery (Indian government, 52.8 interest; Phillips Petroleum, 26.4%; Duncan Brother, 2%; with remaining interest held by local private and public entities) and the Madras refinery (Indian government, 74%; NIOC 13%; and Amoco International, 13%). Negotiations are near completion for the sale of Iranian interests to the Indian government.
In December 1981 the Indian government set guideline for oil exploration. Thirty-two offshore and onshore blocks were opened for oil exploration, and thirty-four foreign oil companies were eligible to submit production-sharing proposals. ONGC is expected to be a nonoperating partner during exploration and a participant in ventures during production. Its success with the Bombay High oil and gas find (with a production of about 160,000 b/d in 1981 expected to reach in excess of 300,000 b/d by 1985) demonstrates ONGC's growing expertise in petroleum development. The Bombay High fields were also the beginning of cooperation between ONGC and the World Bank. The Bombay High field represents a turning point in India's oil-industry development. It marks the beginning of cooperation between the Oil and Natural Gas Commission and the World Bank. In 1977 the bank made a loan of $150 million toward Phase III of the Bombay High development program. When the loan was made the ONGC was relatively inexperienced in offshore programs and lacked experienced technical staff to handle such projects. By attracting competent personnel and introducing training programs, and with the advisory support of the World Bank on technical issues (management and technology), ONGC is now implementing the project successfully. The project will probably cost close to $2 billion, with Phase I and II representing, 10% of total costs and Phases III and IV representing roughly 30-35%. In December 1981 the World Bank made a loan of $400 million for Phases IV and V, which represents the foreign-exchange cost of these two phases. With ONGC becoming increasingly involved in offshore operations, the World Bank is expected to play an important role by providing the necessary technical assistance.

ONGC is a small producer of natural gas whose reserves, including the Bombay High fields, are estimated at 9.3 trillion cubic feet. The absence of the necessary pipelines to transport the gas to consuming centers has resulted in the flaring of the majority of India's gas output. In 1976 flared gas was estimated at 50-60% of total production (215 million cubic feet per day).

The government intends to establish the production processing and pipelines necessary to market these gas finds. It is seeking a $200 million loan from the World Bank to handle the Bombay High associated gas. Other plans include the exploration of gas finds in the Bassein fields for petrochemical and fertilizer development. Petroleum, coal, and electricity (commercial energy) accounts for 47% of total energy consumption in India, whereas traditional energy sources, such as firewood and agricultural products, constitute the rest of energy consumption. Four-fifths of petroleum product consumption occurs in the transport and industry sectors. Thus, in India petroleum products are used as intermediate energy sources, reducing the chance of significantly cutting consumption. In fact, household demands are a low and falling proportion of total petroleum consumption. Commercial energy has been growing at about 5% annually, faster than the growth rate of traditional energy sources. This growth has resulted in an increasing share of commercial energy in India's overall energy picture.

17 Ibid, no.15, p.208.
The share of petroleum consumption in total commercial consumption is also growing and presently accounts for 22%. The Sectoral breakdown and growth rates of commercial energy consumption during the 1960s and early 1970s are shown in Table-2. During this period industry and transport represented nearly four-fifths of all commercial energy consumption in India.

The most rapidly growing sector is agriculture, but that, too, uses commercial energy as an intermediate product, reducing the hope of cutting consumption. The period from the 1960s to the last half of the 1970s, with plentiful and cheap energy resources, resulted in a fairly rapid growth in India’s economy, but the impact of the petroleum price increases of the 1970s left India in a difficult position. India is entering the 1980s with uncertain growth prospects, primarily as a result of scarcity of energy resources. The economy also faces basic infrastructural and supply constraints, which require substantial investment, and an increasing import bill, with negative balance of payments implications. India’s balance of trade, which was a surplus in 1976 and 1977, began to change by 1979-80, when sharp oil price increases and domestic supply shortages caused the import bill to rise by over 30%. The balance of payments experienced a further sharp deterioration in 1980-81. International oil price increases and domestic supply shortages continued. The rise in petroleum prices has caused oil imports to use over 60% of total export earnings over the past few years. All these factors resulted in industrial production falling sharply in 1979-80 (-1.4%), after an average rate of growth of 7%.

The government has introduced a number of policy changes designed to improve the environment for industrial investment and production. Some of these changes were announced in the June 1980 budget speech, some in the July, industrial policy resolution of 1980, and others in various notifications and announcements throughout the year. One of the most important changes was the significant enlargement in the category of industrial firms allowed automatic expansion of 25% in five years, without a new license or other permission of the government, subject to certain conditions. It remains to be seen what effect these measures will have on industry in general and on the oil industry specifically. India in past improved the atmosphere for foreign petroleum investment, particularly in offshore oil exploration. These changes have been reflected in the success of India’s domestic oil output, which rose from 225,000 b/d in 1978 to 320,000 b/d in 1982. Of this production rate, 240,000 b/d, or 75%, would flow from offshore fields. This total indigenous production would represent nearly 60% on India’s annual consumption. Oil and gas were also recently discovered in the Bay of Bengal.

Although it is too early to speculate on the importance of these discoveries, the Bay of Bengal may be the most promising Indian find since the Bombay High discovery and could make India’s long-

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18 The 1975 Provision for automatic growth was applied to an initial list of fifteen engineering industries producing capital goods. Notification in 1980 added nineteen core industries and those involving high technology or having long-term export potential. The conditions are that items produced should not be reserved for the small-scale sector, that expansions requiring imported capital goods would attract export obligation, and that the firm should not be a ‘dominant undertaking’ in the industry.
term oil outlook more encouraging. In 1982 nearly all refineries are in the public sector under the management of the Indian Oil Corporation. The Indian government plans to expand its capacity by (1) building a 120,000 b/d refinery (with Soviet assistance) in Mathura; (2) expanding the Madras refinery; and (3) modifying the facilities at Visakhapatnam to handle Bombay High Oil. Government control over marketing activities has continued to increase, and currently the Indian Oil Company handles all India’s crude oil imports and distributes imported oil products in addition to those produced by its own refineries. In the marketing and distribution phase, the government is restructuring its activities into four regional sectors: IOC will supply the north; Hindustan Petroleum (previously Exxon’s operations) will supply the south; the Bharat Refineries will supply the west; and Caltex Burmah Oil, and Assam Oil facilities (as acquired and consolidated by the Indian government) will supply the east. In the near future, despite additional crude oil production, India will continue to import about 50% of its total oil consumption. The government has directed ONGC to expand its efforts to obtain petroleum directly from OPEC sources. Iraq and Iran will continue to play a dominant role in the supply of India’s imported crude oil. Until the Iraq war is over, however, other Persian Gulf oil producers will supply the balance of India’s oil requirements.

Russia is expected to continue to be India’s primary supplier of refined products. Despite the improvements in the atmosphere for foreign petroleum investments, Western companies continue to be unwilling to enter into Indian oil exploration activities. As of November 1981, India had the second highest number of rigs in the Asian exploration scene (forty-three), including six offshore drilling-rig platforms. The question remains whether India, with its large local market and its limited foreign exchange, will continue to offer the MNOCs an acceptable return or whether it will once again, after oil is found, squeeze the MNOCs for additional benefits. On one hand, the MNOCs no longer have access to low cost Persian Gulf oil, and might be willing to sell their technology to India’s oil industry; while on the other hand, however, they recall too well the nationalizing passion of the Indian government. An American oil executive, when asked why so few U.S. oil companies have responded to Indian bid invitations, stated, “the industry generally distrusts the Indian government. It has a record of nationalizing U.S. companies or squeezing them for additional benefits after the contractual terms are set”.19

India, like many OIDCs, must be able to alleviate the nationalization fears of the MNOCs, and the World Bank might be useful in its role as a mediator. India ranks sixth in the world in terms of energy demand accounting for 3.5% of world commercial energy demand in 2001. But the latest estimates indicates that India has around 0.4% of the world’s proven reserves of crude oil and about

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0.4% of world’s natural gas reserves. As against this, currently the domestic crude consumption is estimated at 2.8% of the world’s consumption. The balance of recoverable reserves as estimated in the beginning of 2001 is placed at 733.70 million tones (mt) of crude and 749.65 billion cubic meters (BCM) of natural gas. The share of hydrocarbons in the primary commercial energy consumption of the country has been increasing over the years and is presently estimated at 44.9% (36.0% for oil and 8.9% for natural gas). The demand for oil is likely to increase further during the next two decades. The transportation sector will be the main driver for the projected increase in oil demand. Consequently import dependence for oil, which is presently about 70%, is likely to increase further during the Tenth and Eleventh Plans.20

Commercial Energy Production

The country has seen an expansion in total energy use during the last five decades, with a shift from non-commercial sources of energy. Accordingly, the production of commercial sources of energy has increased significantly. Table-3 indicates the trends in production of various primary commercial energy resources. Coal production is likely to grow at an annual rate of 4.46% in the Tenth Plan period (compared to 2.4% annual growth rate during the Ninth Plan period) to touch 405 mt in the terminal year, 2007. As against this, the coal demand in that year is estimated at 460.50 mt. Part of the gap, is proposed to be met through import of both coking and non-coking coal. About 70% of the projected demand is for public sector utilities. A substantial expansion in the domestic coal production is, therefore, needed to meet the requirements of the targeted generating capacity addition envisaged during the Tenth and Eleventh Plans.

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</thead>
<tbody>
<tr>
<td>Coal mt</td>
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<td>72.95</td>
<td>114.01</td>
<td>211.73</td>
<td>325.65</td>
<td>405.00</td>
</tr>
<tr>
<td>Lignite mt</td>
<td>0.05</td>
<td>3.39</td>
<td>4.80</td>
<td>14.07</td>
<td>24.30</td>
<td>55.96</td>
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<tr>
<td>Crude Oil mt</td>
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<td>6.82</td>
<td>10.51</td>
<td>33.02</td>
<td>32.03</td>
<td>33.97</td>
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<tr>
<td>Natural Gas</td>
<td>1.44</td>
<td>2.35</td>
<td>1.79</td>
<td>29.69</td>
<td>37.62</td>
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<tr>
<td>Hydro Power Bkwh</td>
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<td>25.25</td>
<td>46.54</td>
<td>71.66</td>
<td>82.80</td>
<td>103.49</td>
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<tr>
<td>Nuclear Power Bkwh</td>
<td>-</td>
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<td>3.00</td>
<td>6.14</td>
<td>16.92</td>
<td>19.30</td>
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<tr>
<td>Wind Power Bkwh</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.03</td>
<td>1.70</td>
<td>4.00</td>
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</table>

Source: Tenth Five Year Plan, p.764.

Figure 7

India's Commercial-Energy Consumption by Sector (percent)

- 1961
- 1976
Figure 8

Balance of Trade ($ Billion) 1990-91 to 2002-03

-556.75 1999-00
-385.8 1998-99
-273.02 2000-01
-361.82 2001-02
-438.07 2002-03

-600 -500 -400 -300 -200 -100 0
Figure 9

Trends in Commercial Energy Production (1960-61 to 2002-03)

- Coal
- Lignite
- Crude Oil
- Natural gas
- Hydro Power
- Nuclear Power
- Wind Power
Figure 10

The World's Primary Energy Supply in 1973

- Oil: 35%
- Gas: 11%
- Hydro: 16%
- Coal: 2%
- Renewable: 0%
- Nuclear: 45%
- Others: 1%

Diagram showing the distribution of primary energy sources in 1973.
Coal contributes to around 22% of the total global primary energy consumption against 40% from oil, 23% from gas, 7% from nuclear, 2% from hydro and 6% from renewables. Around 38% of total world electricity generation is based on coal. In the case of India, the share of coal in the supply of primary commercial energy has been about 50%. About 70% of the power generated in India is coal and lignite based. The global hard coal consumption in 2000 was 3,738 mt against production of 3,639 mt. Coal demand grew by about one bt between 1980 and 2000. China is the largest producer (1,171 mt) followed by the United States (899 mt) and India (310 mt). The major coal exporters are Australia (186.8 mt), South Africa (70 mt), Indonesia (56.8 mt), China (55.1 mt) and United Kingdom States (53 mt). The major coal importers are Japan (143.3 mt), Republic of South Korea (61.7 mt), Chinese Taipei (45.4 mt), India (24.5 mt) and United Kingdom (23.5 mt). Coal is a diverse and abundant source of energy.

Most of the coal is consumed domestically and only 12% of the world production is traded internationally. Coal will continue to play a key role in the future global energy demand. Known coal reserves are spread over almost 100 countries and at current production levels, proven coal reserves are estimated to last for over 200 years. In contrast, proven oil and gas reserves are estimated to last around 40 and 60 years respectively at current production levels. Although combustion of coal produces environmental pollutants, this can be mitigated to a large extent by the development/adoption of clean coal technologies as they can substantially reduce the level of carbon dioxide emissions per unit of energy output. A 5% conversion efficiency improvement in a coal-fired power plant brings more than 10% reduction in carbon dioxide emissions. A global response encouraging voluntary actions on the part of industry and cooperation between industry and government on this issue is required.\footnote{Tenth Five-Year Plan, (2002-07), p. 778.}

Coal remains India’s principal source for meeting its primary and secondary commercial energy requirements. Of the 1,04,917.50 MW of overall installed power generation capacity in the country (as on March 31, 2002), about 59,386 MW is coal based and 2,745 MW is lignite based, totaling to 62,131 MW or 59%. In the 1970s, the coal sector was nationalized and emphasis was laid on coal-based thermal power generation as the backbone of India’s energy economy. In the past two decades, coal consumption grew at an annual rate of 5.7% while coal production has grown at 5.7% annually.

In 2000-01, coal production touched 313 mt (of which about 96% is from public sector) from 114 mt in 1980-81 and lignite production reached 24.25 mt from 5.11 mt over the same period. Indigenous coal is likely to remain the most stable and least cost option for the bulk of India’s energy needs in the foreseeable future. This is so because coal based thermal power generation capacity has a shorter gestation period and lower specific investment costs when compared to other locally available commercial energy resources like nuclear or hydropower. Thus, there is need for concerted efforts for
the overall development of the sector in future plans. Energy security concerns underscore the need to
further develop indigenous coal production in foreseeable future. Around 38% of total world electricity
generation is based on coal. In 1999, Indian coal’s share in electricity generation was around 70% against 56% in the case of United States, 80% in the case of China, 84% in the case of Australia, and 90% in the case of South Africa, 51% in the case of Germany and Poland at 96%. Also, coal is a key
input for the steel and cement industries.

The assessed raw coal demand of 354.29 mt in 2001-02 was to be met through a domestic production of 322.73 mt, a stock draw down of 1.5 mt from Coal India Limited (CIL) and import of 15.97 mt of coking coal for steel. This left a gap of 14.09 mt, which was proposed to be met from CIL and SCCL should the demand pick up. As against this, the anticipated coal consumption/oftake of 348.43 mt in 2001-02 is proposed to be met through domestic production of 325.65 mt, likely coking coal imports of 10.80 mt with the balance being met through import of non-coking coal and stock draw down from CIL. Import dependence for coking coal in the case of steel sector is on increase, as the domestic supplies are not improving. Further, imports of non-coking coal are also on the rise, particularly in coastal regions, due to high domestic freight rates. Since the domestic coal production in 2006-07 is expected to touch only 405 mt against an estimated coal demand of 460.50 mt excluding 5.24 mt of washery middling, this will leave a gap of 55.50 mt. This is proposed, to be met through import of 17.18 mt of coking coal for the cement sector, which works out to 4.4% of the estimated coal demand, 1.2% less than imports in the Ninth Plan. However, that still leaves a gap of about 35.02 mt. Coal imports account for only about 5.6% of the total domestic consumption in the current year. The steel sector has been importing coking coal mainly for blending with domestic coal to obtain the desired quality for steel production. The cement industry and coastal power stations are importing non-coking coal.

The current domestic production of crude oil caters to nearly 30% of the demand and likely to marginally increase from 32.03 mt in 2001-02 to 33.97 mt in 2006-07. As against this, the demand for petroleum products, projected as 99.13 mt in 2001-02, is estimated to grow at the rate of 5.7% a year to touch 134.6 mt in the terminal year of the Tenth Plan and 172.5 mt in the terminal year of Eleventh Plan. India’s natural gas production reached a level of 29.69 BCM in 2001-02. The projected domestic production of natural gas in 2007 is 37.62 BCM. The country has been able to meet the demand with the available domestic production till recently. However, the demand is likely to grow rapidly in the near future. A number of projects for setting up of LNG terminals have been approved by the government to bridge the demand-supply gap. Four LNG terminals at Dabhol, Dahej, Hazira and Cochin are in advanced stage of development and are likely to be completed by the end of the Tenth Plan. India is emerging as a large importer of crude and is planning to import LNG during the Tenth Plan period. If
the present trend continues, India’s oil import dependency is likely to grow beyond the current level of 70%. Future strategies should focus on increasing exploration activities to enhance the level of recoverable reserves of the country. India’s commercial energy demand is expected to grow even more rapidly than in the past as it goes down the reform path in order to raise standards of living. A large part of India’s population does not have access to commercial energy. The 479 kgoe per capita total energy consumption is only about 20% of the global average in 1997 and compared poorly with the per capita consumption of Thailand (1,319 Kgoe), Brazil (1,051 Kgoe) and China (907 Kgoe). More than 60% of the Indian households depend on traditional sources of energy like fuel wood, dung and crop residues for meeting their cooking and heating needs. Out of the total rural energy consumption, about 65% is met from fuel wood. Fuel wood consumption during 2001-02 is estimated at 223 million tones of which is for household consumption and the balance for cottage industry, big hotels etc. the consumption of animal dung and agro-waste is estimated at 130 million tones, which does not include the wet dung used for biogas plants.

It is assumed that the wet dung used as manure is being diverted to biogas plants as these plants, in addition to providing a cleaner fuel, also supply enriched manure. Even though there has been an impressive increase in the availability of the two petroleum based domestic fuels-liquefied petroleum gas (LPG) and Kerosene (SKO), they do not appear to have made any significant dent in the pattern of fuel consumption in the rural areas. To some extent, the biogas programme has made progress in rural areas and it is estimated that about 3.2 million plants have already been installed as on August 2001. The National Council for Applied Economic Research (NCAER), Delhi, has estimated the likely availability of gas from these plants during 2001-02 at 1,360 million cubic meters. India’s energy use is mostly based on fossil fuels. Although the country has significant coal and hydro resources potential, it is relatively poor in oil and gas resources. As a result it has to depend on imports to meet its energy supplies. The geographical distribution of available primary commercial energy sources in the country is quite tilted, with 77% of the hydro potential location in the Northern and Northeastern region of the country. Similarly, about 70% of the total coal reserves are located in the eastern region while most of the hydrocarbon reserves lie in the West.

The world energy consumption pattern has been changing over the years. Presently, the share of oil in the world energy mix is 40% and that of gas is 23%. The International Energy Outlook projections indicate that the hydrocarbons will continue to cater to 68% of the total commercial world energy demand over the next two decades. The share of oil may go up as the latter is emerging as the preferred feedstock and fuel since it is more environments friendly. Against a 63% supply of primary commercial energy through hydrocarbons in the world, in the case of India it is 44.9% (36.0% for oil and 8.9% for natural gas). There is limited scope for the increased use of gas in India, unless some large reserves are
discovered or there is large-scale import. The demand for oil in the country over the next five years is expected to grow at an annual average rate of 3.6%, which will be higher than the average growth of around 2% in the world energy demand.

Significant hydro and nuclear generation capacity is likely to be added during the Tenth Plan period. The capacity addition programme includes 16,083 MW from hydel power plants and 13,00 MW from nuclear power plants. In addition, 2,000 MW of energy is planned to be harnessed from wind farms. The trends in primary commercial energy supply from various sources between 1953-54 and 2001-02. Though coal production increased about three times from 114 mt in 1980-81 to 325 mt in 2001-02, the share of coal in total energy supplies has declined from a level of 58.9% to 51.1%. This could be partly due to the increase in the share of inferior grade coal in over-all coal production. The primary reason, however, is that the share of hydrocarbons in the total energy consumption of the country has been increasing over the years and is currently estimated at 44.9% as compared to 37.2% in 1980-81. Net energy related imports of 87.85 MTOE in 2001-02 include the import of 75.43 mt of crude and petroleum products, 19.60 mt of coal and 1.4 Bkwh of electricity from Bhutan. The share of non-commercial sources in the total primary energy supply is 31.8% in 2001-02, down from 53.1% in 1980-81.

The core problem of energy security in the area of oil and gas is that India possesses only about 0.4% of the world's proven reserves of oil and 0.4% of the world's proven reserves of gas. India's domestic production currently is around 33 million metric tonne (MMT) of crude oil per year. However the gap between indigenous crude production and requirement already stands at around 70% (up from 30% a decade ago). Demand is expected to go up to 368 MMT per year by 2025. However, domestic production is expected to increase only marginally. India may, thus, have to import around 90% of its crude oil requirements in the coming decades. Currently, India productions 23 billion cubic meters per year of natural gas, making this the fastest growing energy source in the 1990s. Demand for natural gas is expected to increase dramatically with imports at the level of over 70% of the requirements of natural gas in the coming years. India is deficient in energy resources compared to our current and future needs. The per capita energy consumption in India is only 300 kg oil equivalent (Kgoe) as compared to the world average of around 1500 Kgoe. Our per capita consumption of energy was less than half of China's and one-twentieth of that of North America in 1997. Per capita consumption of hydrocarbons is a mere 113 Kgoe one-eighth of the world average. Every oil shock has had as adverse impact on the Indian economy. The primacy of oil is evident from the fact that it accounts for 42% of global energy consumption. Oil and natural gas together account for 65% of global energy requirement and therefore, dominate the global scenario. It is said that oil has held center-stage in the 20th century and perhaps, natural gas is due to assume the same position in the 21st century. In contrast to the global energy
situation, the mainstay of India’s basket is coal which accounts for more than 50% of India’s energy consumption.

However, over the past decades, the countries energy basket has witnessed a rapid rise in the share of oil and natural gas making in roads into the share of coal. The energy security issue has two dimensions supply security and price security. For oil importing country like, India. Which is dependent on imports to meet 70% of its requirements. On the supply side, there are favorable factors like oil being traded on a global scale and generally free of barriers. However, the unfavorable factors are the concentration of 65% of global oil reserves in the Persian Gulf region. The OPEC, by controlling the total availability of exportable oil from the producing countries, has been setting the direction in which the oil prices move. We also see that oil prices moved to historic highs during the Iran-Iraq war and the Gulf crisis, in the eighties and nineties respectively. The post trends indicate that oil prices in the international market decreases. This can happen either a situation of major conflict or war in any oil producing region or when the oil exporting countries decide together to limit the overall supplies of oil in the market.

How can a country like ours, that meets 70% of its requirement of oil through imports, provide security against unstable and high prices of this primary energy source. When we consider the geopolitics of energy and its security from an Indian perspective, most of the visible and potential trends that will drive Indian concerns are within India’s immediate or near periphery sphere of interest, five conditions, in particular, will increasingly inform the way Indian strategists thinks about their energy security:

(i) The Persian Gulf region would remain the center of gravity of future energy equations. The Persian Gulf region possesses around 65% of the world’s oil reserves and exported around 41% of the world’s export of oil in 1995. Three countries of the Gulf account for a total of 26% of the global reserves of natural gas (Iran at 16% is the world’s second largest after Russia’s 33% and Qatar and UAE combined possess 10%). The Gulf is expected to produce 59% of the world’s exports by 2020.

(ii) India’s energy demands are also increasing (in fact, its energy consumption has exceeded that of most industrialized countries) and are projected to rise steeply over the next few decades. Currently, oil and natural gas comprise around 40% of the total energy needs of the country, and over the next two decades, this is projected to go up to around 45%. However, India’s domestic oil production has remained stagnant at less than 33 million tonnes, and unless some hefty investments and technology are introduced, it is unlikely that production will increase substantially. As a result, the gap between demand and supply will increase over the years as consumption of oil and
natural gas goes up. The high level of energy imports will lead to a major drain on the country's foreign exchange reserves. India imports around 70% of its total oil demand, causing the 1999-2000, oil imports bill to go up to around Rs. 44,160 crore ($9.6 billion). One can gauge the impact of this huge foreign exchange outgo on the country's security environment, as like other importing countries, this increasing dependence on imports will make the country vulnerable to supply shocks, whether due to physical disruption (due to conflict) or price volatility.

(iii) Since 1999, the oil import bill in India has strained the economy as the global oil prices have increased sharply and there is renewed interest with in the Indian government for large scale natural gas imports from the region. Cross-border pipelines are one of the best long-term solutions to carry natural gas to regions with high-energy demand. While this concept is well established in North America and Europe, it is a long way from being accepted in Asia.

(iv) India cannot afford to ignore such assessments as it seeks ways to build a growing partnership with countries in the Persian Gulf like Iran, Oman and Qatar to meet its growing requirements of natural gas. It is obvious that with 65% of the world's oil reserves and one-third of its gas reserves located in the countries of Gulf, energy cooperation with this region is going to become increasingly crucial, it does make sense to diversify one's source of energy supplies and a case can be made out for the need to look for increasing supplies of Central Asian gas.

(v) But, here again, the challenge posed by growing threats from religious extremism fostered by the Taliban is formidable. As the global trends 2015 report notes: “Decades of foreign domination and civil war have devastated Afghanistan society and economy, and the country is likely to remain internationally, isolated a major narcotics exporters and a haven for Islamic radicals and terrorists groups”. Given the active role of the Taliban is promoting terrorism globally and more significantly in its immediate neighborhood in Central Asia, the Xinjians province of China, Chechnya and the in the Subcontinent, there is little or no prospect of sourcing Central Asian gas supplies through Afghanistan and Pakistan in the foreseeable future. In these circumstances, it does appear that Iran will have to serve as the major transit center for requirement of natural gas. As a new pipelines come up linking Central Asian countries to ports in the Black Sea and the Mediterranean Sea.

We would have to examine the cost effectiveness of meeting our requirement of oil from these ports. In the meantime, it is important that Indian corporations like Oil & Natural Gas Commission (ONGC),
seeks to participate in efforts for oil and gas exploration in Central Asia. A comprehensive energy strategy for India will involve a wide range of measures: 1. Domestically, there is need to make energy pricing policies more realistic and step up efforts to develop our own energy sources while making the energy sector more effective for foreign investment. 2. Measures for energy conservation and the maintenance of a strategic stockpile for emergencies are also important factors that need to be borne in mind. 3. The government must initiate steps to develop measures for maritime security in the Indian Ocean Region. While, the Indian Ocean rim-association for regional cooperation (IOR-ARC) is an exclusively economic forum, we need to consider measures to promote maritime security cooperation in the Indian Ocean region. The ASEAN regional forum (ARF) is a forum that could be usefully utilized to discuss energy security issues. It is time we looked at these comprehensively, as they are vital to our own long-term security and well-being.

Although great power politics has always been a factor in managing access and control over energy resources, in the emerging situation, many of the players in the energy scenario are going to be different. 22 Most of the hydrocarbons reserves will become increasingly concentrated in the Persian Gulf region, which itself is likely to set links to the Caspian region either through pipelines or exchange arrangements. Asia as a demand heartland and the Gulf region as the resource periphery will became increasingly interdependent for energy supplies. The Persian Gulf will continue to be crucial for energy and stability in the coming decades. But USA and European Union dependence on the Gulf are likely to decline. As things stand now, there is no reason to anticipate that nuclear power will make a significant contribution in meeting Asia’s growing energy requirements. Nevertheless, the use of nuclear energy will increase markedly in energy deficient countries of the developing world, especially India and China, as they search for diversification and self-reliance in the energy sector.

The new energy supply relationships may have important political and national security implications that will affect the strategies of some States directly and those of others indirectly. For instance, in South Asia, Myanmar and Bangladesh will be central players in regional gas supply, which would present India with a number of potentially difficult strategic problems. China is already building energy relationships worldwide, in Central Asia, Russia, Africa, and the Persian Gulf and even in Latin America. While expressing views on the implications for energy security, the major geopolitical trends that are likely to influence supply and demand of oil and gas in the coming years would be as follows:

1. Power politics and competition among major players.
2. Political problems related to the transportation of energy.

22 Jasjit Singh, "Oil and Gas in India's Security", (Law Knowledge World in Association with Institute for Defense Studies and Analyses New Delhi, July 2001).
4. Pakistan’s pursuit of its strategic goals through the use of transnational terrorism as an instrument of politics.

5. Continuing domestic fragility of important energy producers is likely to affect energy security in the long run. The instability in the Caucasus, Afghanistan, West Africa, Latin America comprises a good example in this respect; potential conflict in key energy rich areas and transportation routes could have serious implication for countries with high imports dependency; the Persian Gulf region continuous to be vulnerable to future conflicts. Instability in Indonesia, and problem in the South China Sea could have serious consequences on energy security for the East Asian countries.

6. Vulnerability of strategic choke points, especially the Straits of Malacca, the Strait of Hormuz, the Indian Ocean and the South China Sea will continue to affect energy security in the coming decades.

7. Acts of terrorism and piracy at sea could endanger oil and gas traffic, impacting on the cost and availability of energy.

8. The competition between the Persian Gulf producers and new entrants from the Caspian basin will also have implications.

9. Environment proliferation issues and globalization will have their impact on energy security as well.

10. India’s gas would come from three or four directions the Persian Gulf, Central Asia, Bangladesh and South East Asia.

Energy cooperation and trade would be the biggest confidence building measures (CBM) for peace between the two countries: four areas for cooperation in the oil and gas sector were identified: Trans-boundary natural gas trade, trade in refined petroleum products, cooperation in oil and gas exploration, and cooperation in natural gas vehicles (NGV) development. The importance of Indo-Iran cooperation was repeatedly emphasized during the deliberations. It was pointed out that future collaboration and cooperation between India and Iran is vital for both countries. Firstly, because Iran is a huge in the energy sector, interested in large-scale supply of Iranian gas to the Indian Subcontinent. The geographical location of Iranian gas resources especially the South Pars fields in the venture of the coming years. Secondly, the natural outlet of Caspian energy to India’s policy towards Asian countries is based on the ‘Asian Identity’. Iranian and Indian leaders are discussing this policy and greater cooperation among Russia, China, India and Iran. The prospect for construction of a gas pipeline from the Persian Gulf to the Indian Subcontinent is also rapidly moving towards realization but its completion will depend on India Pakistan cooperation. However, the implementation of this requires the resolution of complicated political and financial issues.
It was felt that the participation of the private sector in an international group to export Persian Gulf gas to the Indian Subcontinent might be the beginning of a new trend in this region. On the prospect of cooperation among nations there was a consensus that interdependence could bring people together, and countries should look for cooperation rather than conflict. Therefore, while thinking about energy security, cooperation should be the nation’s first choice, and conflict should be avoided, in today’s era of globalization, energy security is no longer an issue which one country can handle all by it. Qatar-Iran Pakistan pipeline: this $3.2 billion project, which is no the drawing board, will cover a distance of 1610 km along the Iran-Pakistan coast up to Jiwani, near Karachi, promoted by Sharjah crescent, the ultimate destination of this pipeline to India. Turkmenistan-Afghanistan Pakistan oil pipeline: the $2.5 billion, 1,499 km long proposed pipeline, which was supposed to bring crude from oil rich Central Asia to South Asia run into trouble with the Taliban in Afghanistan.

The project, promoted by UNOCOL of the US, has been virtually abandoned. Iran-India gas pipeline: this is $6 billion project will bring gas from Iran to India, covering a distance of 2,657 km. If it takes the onshore route through Pakistan, the pipeline will travel 1,100 km in Iran, 707 km in Pakistan and 850 km in India before connecting to the HBJ network in Rajasthan. Since a pipeline running through Pakistan is fraught with risks, the offshore route is also being considered but it is three times costlier. And it is crucial conditions that India wants incorporated in the agreement for an onshore pipeline through Pakistan: 1. Iran would be responsible for delivering gas at the Indian border; India will not be concerned with events that could disrupt gas supply, including sabotage of the pipeline or Pakistan refusal to allow transit of gas. 2. If Iran is unable to deliver the specified quantity of gas on any day it will pay 25% of the value of gas not supply plus compensation to cover cost of alternative fuel used. 3. Pakistan will be responsible for any subversive activity that affects gas supply. Pakistan will honour GATT agreement and WTO on transit of gas.

The Caspian basin could have been an alternative source of oil supply, but this region is landlocked and no pipeline infrastructure is yet in place for import of these energy resources. Evidently the issue of energy security looms large; nevertheless, some developments in the Gulf region are encouraging. As more and more private oil and Gas Company’s invest in this region, it is hoped that the diversity of supplies would result in more competition in the industry. Also producers and consumers are now being integrated with suppliers making downstream investments in consuming countries. Energy security is not limited to ensuring smooth supplies of energy at reasonable prices, it also entails production and use of energy in a manner that is least damaging to the environment and promotes sustainable developments. The high import dependence of crude constituted a major drain on the country’s foreign exchange reserves. An urgent need to increase domestic crude availability through increase exploration in the country was thus felt. However such an exercise required massive financial
investments. The MoP&NG (Ministry of Petroleum & Natural Gas) estimated that about $60 billion would be required for the development of indigenous oil and gas sector such large scale investments were beyond the scope of the NoCs and thus, the involvement of the private sector was prioritized.

ONGC Videsh Ltd (OVL), which has been aggressively into acquisition all through last year, has done it yet again. And this time around, OVL has struck black gold in Angola. The company has acquired a 50% stake in a deepwater offshore block in the West African country by buying out Shell’s entire equity for $600 million. OVL and Shell Development Angola BV announced that they have reached an agreement for acquiring Shell’s entire interests (50%) in the deep-water offshore Block 18 in Angola to OVL, including the Greater Plutonio development. Oil industry sources say OVL, a 100% subsidiary of ONGC, was in close competition with China National Petroleum Corporation to acquire Shell’s stake in the block.23

Since December last year crude oil prices have crossed the OPEC ceiling of $28 per barrel. In spite of that the cartel decided to cut production by 1 million barrels a day from the beginning of April. Prices have been rising for more than two years. The average price for the OPEC oil basket rose 5% in 2002 and another 16% in 2003. The pressure on prices has been caused by three principal factors. First, the fall of dollar which depleted the oil revenues of the OPEC countries in terms of their own currencies forcing their budgets out of balance. Second, the expected increase in oil production from Iraq with investment from abroad did not come through. The Iraqi oil minister had forecast 2.8 million bpd in 2004 and 5-6 million in future. It is now expected that even if security conditions improve oil production will not exceed 2.5 bpd. Third, Russia does not seem to be in a mood to compete with OPEC any more and may even work in harmony with the cartel. Earlier, Russia was cranking oil to full capacity. There has been a change in Russian policy and after the planned 14% growth in 2004; oil production will remain more or less static.

Obviously, OPEC will remain under pressure to abandon the reference price range of $22-28 per barrel. With the other major non-OPEC producers in compliance, the only way prices will move is up. Some of the OPEC members have even strongly pleaded a currency shift from dollar to euro to hedge against the depletion of reserves. Whatever the choice of means, the expectation is that in 2004 a 10% rise in oil prices in dollars is inevitable. Oil prices are critical to most countries. A rise in oil prices transfer’s resources from oil importing to oil exporting countries and, oil being a major consumers item, an instant jump in inflation becomes inevitable. Higher oil prices in 2004 will lower world GDP growth by 0.5% and push up inflation to about 0.6%. India imports nearly two-thirds of its oil requirement and that absorbs a third of the export earnings. A 10% rise in oil prices would mean an additional

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23 See: Further Discussion; (The Economic Times New Delhi, April 8, 2004). *This is Largest Overseas Acquisition by any Indian Firm, Transaction to be completed this year, Deal Subject to Angola Government & BP thumbs up, and First Production from Block 18 Targeted for 2007; India’s Entitlement will be 5 mt.*
expenditure of $2 billion, which would reduce GDP growth by 0.2% and increase domestic inflation by 1.4%. If subsidies are diluted a further rise in prices will follow.24

Now that the Iraq war is likely to last longer than initially expected, its impact on the Indian economy needs to be assessed afresh. The immediate problem that the country faces is that of rising oil prices. After declining for a brief period, in the hope of a short war, crude prices have once again crossed $30/barrel. Since India meets nearly 70% of its oil demand through imports, a prolonged rally in crude prices can be a setback to the ongoing recovery. In 2002-03, India is likely to import nearly 83 million tonne of crude oil petroleum product imports have come down significantly and are not likely to be much in the future. Assuming a moderate growth in imports to 85 million tonne, every one-dollar per barrel increase in price of crude pushes up the import bill by over $600 million (one tonne equals 7.33 barrels, so 85 million tonne translates into 623 barrels).

Already, the oil import bill for April-January 2002-03 is up 22% of $14.35 billion over the corresponding period last year. Consequently, the trade deficit for this period has widened to $7.17 billion against $6.63 billion in April-January 2001-02. However, this is not a cause for concern. The $74 billion of foreign exchange reserves provide a cushion against any further hardening in oil prices. Even the trade deficit is not a cause for concern. The $74 billion of foreign exchange reserves provide a cushion against any further hardening in oil prices. Even the trade deficit is not worrisome as the current account is in surplus, thanks to ever increasing invisible, especially private transfers and software services revenues.

What is most disconcerting is the impact of this on the retail prices of petroleum products, and the effect of that on inflation. In Delhi, the retail price of diesel has increased from Rs.18.23/litre in August 2002 to over Rs.22/litre now. In the case of petrol, over this period, the increase has been somewhat sharper from Rs 29.18/litre to nearly Rs 34/litre. Fuel, power, light and lubricants have a combined weight of 14.23% in the inflation basket. Within fuel, diesel has the maximum weight of 2.02% followed closely by LPG at 1.84%. This means that for every 1% increase in the price of diesel, inflation, calculated on a point-to-point basis, goes up but two basis points. Over all, a $10/barrel increase in crude price adds about 170 basis points to inflation. In fact, inflation has already touched a eighteen month high of 5.56% for the week ended March 15, against a mere 1.63% a year ago. And this does not include the latest round of price increases a hike of Rs 1/litre for diesel and Rs 1.5/litre for petrol. At some stage, this increase in fuel prices is likely to take its oil on the manufacturing sector, especially the power intensive cement, fertilizers, steel, sugar, chemicals, etc. Export are also likely to be hit by the war, as the Gulf region account for about 11% of India’s exports. Moreover, exports of this region were growing at over 35%. This other sector that could be affected by a prolonged war is tourism. But as of

24 The Hindustan Times, New Delhi., (April 1, 2004).
now, this is not a major concern as we are entering the lean tourism season. Overall, the implications for India of a prolonged war do not look good.\textsuperscript{25}

Indigenous Oil & Gas Production Efforts

India has 26 sedimentary basins comprising both inland and offshore areas. The total sedimentary basin area of India is around 1.784 million sq km up to 200m isobath, of which 0.498 million sq km is moderate to well-explored and 0.601 million sq km is unexplored. The total sedimentary area for deep waters is around 1.356 million sq km, most of which remains to be explored. Immense efforts in exploration have results in estimated predictive hydrocarbon resource base of about 29 billion tonnes of oil and equivalent gas, including 7 billion tons from deep offshore. Out of this only 6.8 billion tonnes of geological reserves have been established through exploration. This leaves a substantial resources base unexplored. Of the total prognostic hydrocarbon resources of India, 33\% lie onshore, 42\% offshore (up to 200m water depth) and 25\% lie in deep waters. India's reserves of oil at the end of 1999 were about 600 million tonnes (a share of 0.5\% of world's oil reserves) and natural gas reserves were about 650 billion cubic meters (0.4\% of world's reserves). With sustained efforts towards petroleum exploration and exploitation, India has also ventured into new frontier areas like coal bed methane (CBM), deep-water exploration (beyond 200m isobath) and gas hydrates.\textsuperscript{26}

The Ministry of Petroleum & Natural Gas Strategy

The need for intensive exploration of the new areas in producing basins and undertaking of bold exploration steps in frontier and deep-water basins, exploring the untapped non-conventional sources of energy like Coal Based Methane (CBM) and gas hydrates etc. have been recognized in Hydrocarbon Vision 2025 (the Ministry of Petroleum & Natural Gas (MoP&NG) strategy paper for the development of the sector). To reduce the dependence on external crude and gas supply, the MoP&NG is following a conscious 4-pronged strategy for enhancing indigenous supply: 1. Exploration in frontier areas. 2. Intensive exploration in the proven areas. 3. Strengthening overseas exploration. 4. Initiation of exploration for non-conventional hydrocarbon resources.

Debates on price and petroleum policies, alternative recycling proposals, and different strategies of capital commitments are all manifestations of efforts to control petroleum transactions. To some extent both exporters and importers recognize their mutual interdependences. Both realize that manipulating these interdependences is a question of strategy and not a principle of value in its own

\textsuperscript{25} The Economic Times, New Delhi. (April 1, 2003).
\textsuperscript{26} See: Oil and Gas Market in India; www.uktradeinvest.gov.uk/oilandgns/India_upstream/profile/overview.shtml
right. The flow of energy across boundaries has become an important political issue, which has dramatically drawn our attention to the peculiar pattern of interdependence that result from energy transactions. Such interdependence has been molded as much by the energy requirements of advanced industrial nations as by desire of the resources rich, less developed nations to exchange heir natural materials for financial benefits, advanced technology, or other valued goods and services. The notion of interdependence has only recently been accepted in the United States as a legitimate view of international relations. This acceptance stems as much from the realization in academe circles that the state centric view is not appropriate to the complexities of contemporary world politics, as it does from awareness in policy-making circles of the increasing difficulty of establishing and maintaining unilateral control over international events. There is considerable disagreement in both academic and policy-making circles about the nature of particular interdependencies generated by the flow of energy across national boundaries.

A related set of concerns pertains to the question of devising international procedures for managing evolving interdependencies. When the policies of one nation become the constraints of another, the issue of procedure is of more than simply academic significance. Contemporary energy problems dramatize the close relationship between policies and constraints. While many of the current energy concerns center around questions of shortages, ensure access to supplies has become an important concern for all nations. Equally important are the issues of cost and price the cost of extracting domestic versus foreign energy sources, and the price to be paid in each case. Recent events have illustrated the extent to which prices can be manipulated with attendant consequences for everyone. We are witnessing today a gradual recognition by all nations of a common quandary: how to meet the growing energy requirements without generations undue conflicts of an economic, political, ecological, or strategic nature. More specifically: how to accommodate the seemingly irreconcilable objective of energy producers and energy consumers. The immediate energy related issues revolve around petroleum. Over the long range the use of alternative sources of energy, where political and economic costs are acceptable, where safety is minimally ensured, and where technological solutions to production problems are feasible, will become of more central concern.

Much of what we know about the structure of energy transactions is based or our experience with petroleum. Despite uncertainties regarding contemporary political and economic problems related to petroleum trade, some established regularities emerge that can assist our understanding of a global energy system based on sources other than petroleum. Current interest in oil related problem have focused primarily on the economic implications of dependence on external sources, and less on political issues or their impact upon prevailing attempts to build viable international institutions for the management of energy flows. Yet, some of the most critical problems, of global system based on
alternatives to petroleum center on the international arrangements to regulate the exploitation and flows of energy across national boundaries.

We argue that these developments were instrumental in the creation of an energy "problem" today, and that the structure of the world petroleum market itself harbored many of the sources of conflict between importers and exporters of crude petroleum. Petroleum is presently the world's largest single source of energy and also basic raw material for almost all the organic chemical products. For the most important uses there are as yet no commercially viable substitutes. Known world reserves are ample only until the turn of the century. The basic factors have generated heated debates concerning the extent to which the energy situation is one of crisis. Some argue that the crisis is real, in the petroleum is basically a depletable, nonrenewable resources and present rates of consumption cannot be sustained indefinitely given prevailing beliefs about known reserves are extensive. Others maintain that it is artificial, in that known reserves are extensive, and supply, if left to market mechanisms, would respond to price. But these arguments are not mutually exclusive, and defining crisis in such dichotomous terms may confuse more than clarify it. Almost everyone recognizes the existence of political factors that have successfully hindered the functioning of market mechanisms, making an otherwise, geologically available resources one that is not readily accessible. We argue here that the present crisis is largely political, and that it has become so by virtue of the convergence of a peculiar set of circumstances.

The world petroleum system defined by pattern of production and consumption, imports and exports has undergone a market transformation over the past two decades, both in the magnitude of trade and in major actors and institutions. The situation has changed from one in which international oil companies dominated the petroleum industry to one in which national governments of the producing countries have become major actors, coordinating their policies and actors; where the governments of the consumers countries have become directly involve; and where the oil companies provide services to both. There have been changes in the patterns of alignments among producers and consumers, and a heightened awareness of the hazards of production and transportation and the virtues of conservation. These developments have contributed to a situation in which the petroleum exporters are now able to manipulate prices to a considerable extent. The discovery of new reserves outside traditional areas of supply, such as those in the North Sea and the South China Sea, may change this situation in the year to come. But the effects, if any, will not be immediate.

The Need for Integrated Energy Planning

Increasing trade in petroleum and higher prices have given rise to complex economic transactions, providing every state with new opportunities for influencing other state, while making each more sensitive to the actions of others. Until now, the planning process has dealt with energy in a somewhat
fragmented manner. Different departments and ministries deal with coal, oil, and natural gas; power; nonconventional forms of energy; and atomic energy. Coordination across different forms is greatly brought about by the Planning Commission through the formulation and implementation of the country’s Five-Year Plans, but thus far these plans have been dominated by a supply orientation, without adequate emphasis on demand management. In 1983 the government set up a high-powered advisory board on energy to provide new directions to the country’s energy policy, and the various ministries and the Planning Commission are gradually implementing its recommendations.27

To reverse the inadequate treatment of energy in the National Plan, several obvious requirements need to be treated as an integral part of the board-planning framework. Briefly, these include:

1. A reduction in the rate of growth of oil consumption leading, preferably to a decline in the quantity of oil consumed and imported.
2. Enhanced development and use of the country’s substantial hydropower potential.
3. Improved conductivity and efficiency of supply sector. (Costly captive generation units meet an analysis of selected energy intensive industries have revealed that close to 25% of their electricity requirements.)
4. A massive program of forestation to increase availability of firewood and charcoal.
5. Exploring the possibility of using solar and other renewable forms of energy.

Overseas Imports Strategies

ONGC Videsh Ltd (OVL), the overseas investments arm of Oil & Natural Gas Corporation plans to invest Rs. 7,500 crore in acquiring and developing oil properties in the current fiscal. The company had invested about Rs. 1,300 crore in a similar exercise last year. OVL is eyeing oil and gas properties in West Africa, CIS countries and Latin America with plan to invest $1 billion a year in acquiring equity in oil. “For the past three years OVL invested on an average $1 billion every year in acquisition of oil and gas fields abroad. We can sustain this for quite some time”. OVL, which got 3.323 million tonnes of crude from Sudan's Greater Nile oil project, is likely to put the Angola field and Block 5A in Sudan on production by 2006 while the Sakhir-1 project was likely to go on stream by late 2005. “Besides, the A-1 gas field in offshore Myanmar, where a huge gas find was made earlier this year; is likely to go on production by 2008”. The company has also stakes in offshore fields in Iran, Iraq, Syria, and Libya. The Vietnam gas field has already started production. Exploration is in progress in Iran (Farsi offshore block), Iraq (Block 8), Syria (Block 24), Libya (Blocks NC 188 and NC 189) and Sudan (Block 5A and 5B). In the Farsi offshore block in Iran, OVL has become the operators; for the first time. Block 8 in

Iraq holds good promise and can give the country a steady stream of oil once the new administration in Baghdad approved the award of the block to OVL. ONGC Videsh posted gross revenue of Rs.3, 502.28 crore in FY2004 (up 1,400% over Rs. 232.80 crore in FY03). Profit after tax was Rs. 428.53 crore (up 626% over Rs. 58.99 crore). The impact of these and other strategies can be evaluated most comprehensively both individually and collectively with the help of an energy-economy model that takes into account the complex interactions and substitutions that are possible in the entire economy.

The Government of India has assured that steps will be taken to put in place policies to enhance the country’s energy security, particularly in the area of oil. While the emphasis on availability of oil is right, energy security extends to a border picture. It has to cover the role of different sources of energy ranging from fossil fuel through hydropower to nuclear energy. Of particular significance is the fact that petroleum resources, including gas, are reaching their limits, globally. Recent reports in international media stress that the known reserves of petroleum resources may have already peaked. The problem is also accentuated by the threats to security in the Persian Gulf, especially in the light of recent terrorist attacks on Saudi installations.

The tenuousness of various estimates regarding known fuel resources is also not a matter of debate, considering recent disclosures, regarding Shell’s accounting for its reserves. Discovery is also not proceeding at as pace as justified by the growth in demand. For these reasons, especially the stranglehold that OPEC countries have on sources of hydrocarbon fuel, attention has turned recently to nuclear power. Nearly two years ago, President Bush himself indicated new start in U.S. policy when he announced new incentives for nuclear power until then considered a verboten subject. The increasing stress on nuclear energy is also evidence that the earlier fears about its risks are seen to be overstated. In the recently enlarged European Union, many new member States have a high degree of dependence on nuclear power, especially; this is true in respect of former members of Comecon. They are also inheritors of Chernobyl type reactors with all their built in risks. In spite of this, there is a feeling in responsible countries in the European Union that the trend towards nuclear power with adequate safeguards cannot be denied. While the environmentalists lobby is against both fossil fuel based power and nuclear power, it has to admit that global warming danger is less in the case of nuclear power although it comes with their own risks of a different kind.

My focus is on nuclear power because it is an area where there is a good deal of interest in investment by many countries abroad. But this should not be the exclusion of an emphasis on hydropower. We have to consider the vast potential of our Himalayan neighbours, Nepal and Bhutan. In particular, there is a considerable amount of work waiting to be done to reopen the Karnali and Pancheswar. Nepal and India can both benefit from these projects. Bhutan’s hydroelectric potential is

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28 *Hindustan Times*, New Delhi, (June 4, 2004).
only partially utilized, with imaginative deals as in the case of Chukka project. The time has come perhaps for an Indo-Himalayan Hydel Power Corporation, which can develop the projects in Nepal and Bhutan with the cooperation of the respective governments and sell the power at agreed rates.

Experts guess that the exploitation of these resources will be equivalent of another Bombay High or two from the point of view of energy security. It will also enable availability of power at relatively cheap rates to farmers and industries in the poor Northern States. After this brief recital of our policy options on the hydel front, let me return to the nuclear power issue. To get a fix on the role of nuclear power, it is worth looking at its current share in power generation in various countries.

Table 3.4: Nuclear Energy as Part of Total Electricity Output (in%)

<table>
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<tr>
<th>Country</th>
<th>Nuclear Energy as Part of Total Electricity Output (in%)</th>
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<tbody>
<tr>
<td>France</td>
<td>75</td>
</tr>
<tr>
<td>Belgium</td>
<td>60</td>
</tr>
<tr>
<td>Switzerland</td>
<td>41</td>
</tr>
<tr>
<td>Japan</td>
<td>35</td>
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<tr>
<td>South Korea</td>
<td>33</td>
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<tr>
<td>Germany</td>
<td>32</td>
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<tr>
<td>Britain</td>
<td>27</td>
</tr>
<tr>
<td>USA</td>
<td>20</td>
</tr>
<tr>
<td>India</td>
<td>2</td>
</tr>
<tr>
<td>Brazil</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>0.50</td>
</tr>
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Table 3.4, regarding the prevalence of nuclear power in different countries of the world is revealing. It is significant that France has 75% of its electricity from nuclear sources. Most European countries, including Switzerland, depend substantially on nuclear energy. France is also one of the largest exporters of power. It is also comparatively cheap. Nuclear power has both capital costs, but raw material is virtually free once the initial input is made.

The Chinese authorities are trying to make up for their earlier lack of progress in nuclear power by going for international bids on a large scale. China has reportedly asked for international tenders for new nuclear power reactors. It is proposing to increase nuclear capacity from about 8 gaga watts to about 400 GW by 2020. This programme would involve construction of two new reactors a year, each costing $1.5 billion. This reminds us of the massive effort undertaken by France in the eighties to
achieve its current high nuclear capacity. China also proposes to establish a second series of four reactors of 1 GW each. The Chinese strategy of inviting international bids is pragmatic and well timed considering the poor order position of nuclear power equipment industry in the developed world. China is also planning to incorporate Brazilian interest in the project considering that Brazil is an important source of Uranium and has a fledgling uranium enrichment industry.29

The whole Chinese order is expected to be in the neighbourhood of $30 billion a mouth-watering temptation for the equipment manufacturers in the world. I am reciting this Chinese tale only to excite interest of our power policy planners in the field. We have to note that the Chinese bid will definitely tie up a lot of capacity and make it harder for us if we were to enter the field. However, considering that no orders have come for a long time, the nuclear power equipment industry in the world, especially in France, seems to be ready for a fresh burst of activity. The decision whether or not India shall go in for foreign nuclear plant is, indeed, a tricky one. We are hamstrung by fear of safeguards required by the nuclear powers. The Chinese precedent should show us a way-out of the problem. In fact, our search for indigenous technology led to dependence on heavy water-cooled reactors, which has put a constraint on our nuclear expansion. According to power experts, heavy water-cooled nuclear plants are more difficult to manage than light water-cooled plants of the Tarapore type.

It was in the 1980s that the late Rajiv Gandhi authorized the go-ahead with Soviet collaboration for a new nuclear plant. The time has come for India to take a decisive step forward to raise the share of nuclear power in the electricity map of India. This, no doubt, required a rethinking on our stand in regard to safeguards, if we want to use non-Russian sources of technology and equipment. But that should not be a difficult exercise, considering that we have already graduated to nuclear power status after Pokhran II. Opponents of nuclear power are many. There are those that fear the problems of disposal of nuclear waste. These are not insuperable. Countries like France and Russia have shown imaginative ways of disposal. We have to learn from them and adapt the methods.

There is, of course the risk of exposure to terrorist threats. But that threat is not peculiar to nuclear power stations alone, although the danger that stolen fissile material presents is greater in today’s circumstances. Here again, there are precedents for well-secured power stations that are offered, particularly in France and Europe.30 India is heavily dependent on imported crude. Indigenous oil production peaked at around 34 million tones in financial year 1989, but has been in gradual decline since then. In the last few years, significant gas finds have been reported, particularly in the Krishna-Godavari offshore basins, but very little oil. New gas pipelines are being planned, which will deliver, over a grid system of 11,500 km, 120 million cubic meters of gas per day. ONGC’s efforts at offshore

29 The Hindu Business Line, (June 14,2004).
30 The Hindu Business Line, (June 14,2004).
equity in oil in Vietnam, Sudan and Sakhalin will bring some relief to supplies. And GAIL India LTD plans to explore for oil and gas with State-owned-Philippines National Oil Co. the two will explore in Northeast Palawan Island, Southwest of Manila. GAIL is moving into exploration as supply falls from its main suppliers, ONGC. GAIL can sell twice the amount of gas currently being pumped through its network. The company owns 10% of Myanmar A-1 venture, which in January discovered a field that holds six trillion cubic feet of the venture. GAIL has won rights to explore eight blocks since 1989. Indian Oil Corporation will set up its first overseas oil refinery in Nigeria as part of its drive to expand globally. IOC has been invited by the Edo State of Nigeria is to set up a grassroots refinery. IOC was keen on getting into oil exploration and production business in Nigeria, the fifth largest oil producer with 2.6 million barrels per day output. A stake in a property in the oil-rich Niger river delta would not only give the proposed refinery raw material but also send back home crude oil for IOC’s seven refineries. Already, IOC refineries import both Escravos and Forcados grades of crude produced by Shell International and Chevron Texaco in Edo. With domestic margins shrinking due to increased competition, IOC is in expansion mode overseas. Besides, looking for upstream opportunities for having its own crude oil, the company has bid for upgrading Tehran and Tabriz refineries in Iran and laying a 1,400 km pipeline in Sudan. IOC, which has already acquired petrol stations in Sri Lanka and the Mauritius, is also looking at retail opportunities in Thailand, Ghana and Indonesia. Nigeria’s estimated proven oil reserves range from 26 billion to 31.5 billion barrels. The majority of these are found in relatively simple geological structures along the country’s coastal Niger river delta.

The attempt to correct the prices of petroleum products through price increases and rationalized of tariffs has to be viewed against this backdrop the argument that current prices understate costs to the oil marketing companies is, no doubt, true. The current corrections may afford some temporary relief, and it is equally important that a strategy be developed for the medium term as well. Some approaches come to mind. If they are strictly adhered to it can well facilitate the Herculean task the oil sector of the Indian economy in the coming decades. Some of the important in this regard are following factors 1. There is a need to examine urgently the dependence of the power sector on liquid petroleum products. Accelerating the exploration of gas reserves and additional LNG capacity would relieve the pressure, and prove efficient and economical. Gas pricing policies, tariffs and clarification on roles of gas carriers needs to be put in place on a priority basis, so that investments in gas based projects can be accelerated. 2. There is a need to look at efficiencies of use. After the first oil shock, considerable work was done in oil conservation measures that should cover the entire gamut of product use, including transportation, generation and feedstock fuels. 3. Some kind of market competition should be introduced, even among the public sector marketing companies, through price differentiation (which now exists in lubricating oils). This would better reflect production and cost efficiencies. 4. Finally, there is no alternative to aggressive exploration strategy offshore and onshore, as well as looking at equity oil stakes overseas. Resources and energy must be thrown this with greater vigour.