INDIA'S ENERGY SECURITY AND CENTRAL ASIA'S ENERGY RESOURCES

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Introduction

This century will witness the twilight of organic energy sources and perhaps the dawn of commercially successful non-organic sources. The mere truth that the former are non-renewable is a major caveat to their incessant use for future needs. This general parameter has several nuances for estimating how optimally and judiciously they can be used and how long we need to survive on them before newer technology comes to take their place. Among the most important indicators are the shifts in energy source composition and the changes in the end-sector consumption packet. These shifts and changes reflect the various production possibility curves which can be projected beyond the energy horizons.

This has indeed been one of the important determinants for India in devising a cogent state

of sustained energy input without too much single-handed reliance on external sources. "The Indian economy has managed to maintain its growth momentum in spite of the low rainfall during the south-west monsoon and *the increase in world prices for oil and steel*."[1] President of India Dr. Kalam devoted his speech on the 59th anniversary of Independence Day to India's energy security and the challenges ahead. Since India requires 114 million tonnes of oil annually, he outlined two principles of energy security. The first focused on the efficiency *mantra* for cutting down losses and taking a more synergistic approach to consumption. The second principle related to tapping all the energy sources at the local, regional, and global level, which include "coal, oil, and gas supplies, until the end of the fossil fuel era, which is fast approaching."[2] "Energy Independence" is an important strategic outlook for India, which he outlined in his speech, i.e. "total freedom from oil, gas, or coal imports." And the time period which India should set to achieve this goal is the next twenty-five years, i.e. by 2030. However, at the moment, the stage is set to increase imports not only of oil, but also of natural gas. This scenario might look quite paradoxical in view of what the president reiterated. But it is a necessary timeout, an intermediary stage on the path to attaining the ultimate goal of moving from "Energy Security" to "Energy Independence." India's energy-output ratio reflects the most inefficient use of energy sources. According to the World Energy Report, in 1997 the energy-output ratio amounted to1.04 toe per $1,000 (at 1990 prices) of the GDP, which was more than double the world average.[3] The main reason for this is that most of the energy needs in rural areas are met by non-commercial renewable resources and biomass which account for more than 40 percent of the total primary energy supply. This is both a boon and a bane. Since this form of energy is relatively free from the energy security metaphor, it reduces the overall security factor by 40 percent. However, this also raises a giant obstacle to attaining energy independence. The energy demand generated by rural industrialization will certainly require more commercial energy, which is a big gap indeed.

The world average per capita electricity consumption is 2,500 kWh per annum, which is far below the OECD consumption levels of 8,000 kWh. According to Dr. Srinivasan, former chairperson of the AEC, if India is hoping to provide at least 5,000 kWh per capita annually by the middle of this century, 1,250-1,350 GW of electricity will be needed, compared to the current generation capacity of 111 GW.[4] This 10-fold increase will be a crucial test for fossil fuel. There is another way of looking at the scenario, according to Anil Kakodkar, current AEC chairperson. If India's economy grows at a rate of more than 5 percent over a 40-year period (which is very likely), by the middle of the century, incomes will rise 8-fold, which is bound to generate a significant rise in electricity consumption. These challenges must be met and "all the options should be tapped, including efficient use of the known fossil reserves, looking for a larger fossil resource base, competitive import of energy (including building gas pipelines, wherever permissible, based on geopolitical considerations which are feasible from the techno-commercial viewpoint), harnessing full hydro potential for generating electricity, and increasing the use of non-fossil resources, including nuclear and non-conventional."[5] At present, nearly 70 percent of electricity comes from thermal sources; hydroelectricity constitutes about 26 percent, and nearly 2.5 percent is nuclear. The potential for expanding the production of hydroelectricity is very limited, and the fast depletion of fossil fuels, accompanied by world price fluctuations, are serious arguments for

[1] Emphasis added. *Economic Survey 2004-2005*, Govt. of India, p. 1, available at [http:/indiabudget.nic.in].

[2] President of India, Dr. APJ Abdul Kalam, speech on 59th Independence Day anniversary, available at [http://www.presidentofindia.nic.in].

[3] See: *World Energy Outlook 1999*, p. 132, available at [http://www.iea.org].

[4] See: M.R. Srinivasan, "The World's Energy Resources and Needs," remarks at the Inter-Ministerial Conference on "Nuclear Power for the 21st Century," 21-22 March, 2005, Paris, available at [http://www.doe.gov.in].

[5] A. Kakodkar, "Energy in India for the Coming Decades," remarks at the Inter-Ministerial Conference on "Nuclear Power for the 21st Century," 21-22 March, 2005, Paris.

expanding the use of nuclear power. It is very unlikely, given the above scenario, that demand for oil and gas will slacken. In fact, the absolute consumption of these fuels has been steadily growing, both in developed and emerging economies. According to the *International Energy Outlook 2005*, the emerging economies of Asia, particularly China and India, are going to increase their demand for energy supplies by no less than 5 percent per year.[6]

India's incremental demand for primary commercial energy accounts for 9 percent of the world total.[7] Given the country's limited oil and gas resources, the consumption of coal is expected to grow, increasing India's share in world coal consumption to 10 percent by 2020.[8] The growing importance of natural gas and oil in industrial forms of energy use will make India more and more vulnerable to international oil-price fluctuations. High prices increase the foreign exchange cost of imported oil. India's import bill for crude oil and petroleum products increased from Rs. 34 thousand crores in 1996-1997 to more than Rs. 78 thousand crores in 2000-2001. And, given the current trends, the inflation rate will continue to play its part in the next few years (see Fig 1). India's crude oil imports have already been increasing at a steady pace. In 2000-2001, net imports amounted to 74.1 million tonnes, which rose to 90.4 million tonnes in 2003-2004.[9] And a sustained demand of 6-7 percent is expected to continue for the time being. The highest demand for oil comes from the transportation sector. The consumption of petroleum products has almost doubled in the last decade. The total consumption of light, middle, and heavy end distillates along with private sector imports was 55 million tonnes in

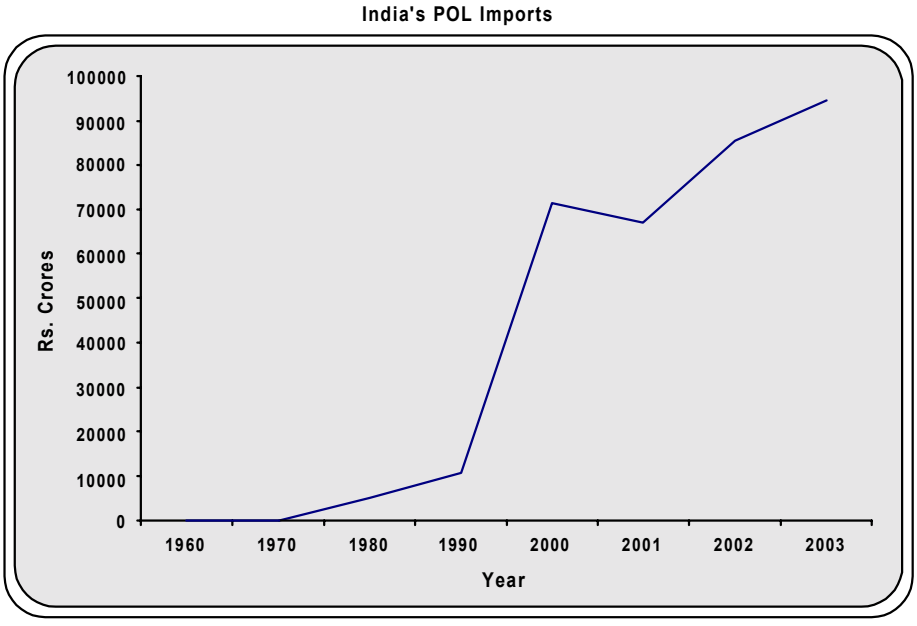
[6] See: Energy Information Administration, U.S. Govt., *International Energy Outlook 2005*, p. 12, available at [http://www.eia.doe.gov/].

[7] See: *World Energy Outlook 2000*, p. 306, available at [http://www.iea.org].

[8] See: Ibidem.

[9] See: *Economic Survey 2005*, Govt of India, Ta- ble 1.30, S-30, available at [http:/indiabudget.nic.in].

Figure 1



1990-1991, which rose to 100 million tonnes in 2000-2001.[10] This scenario is the harbinger of a careful look at the various options available and requires creating a synergy in them in order to minimize the transition lag that is bound to occur with the depletion of fossil fuels.

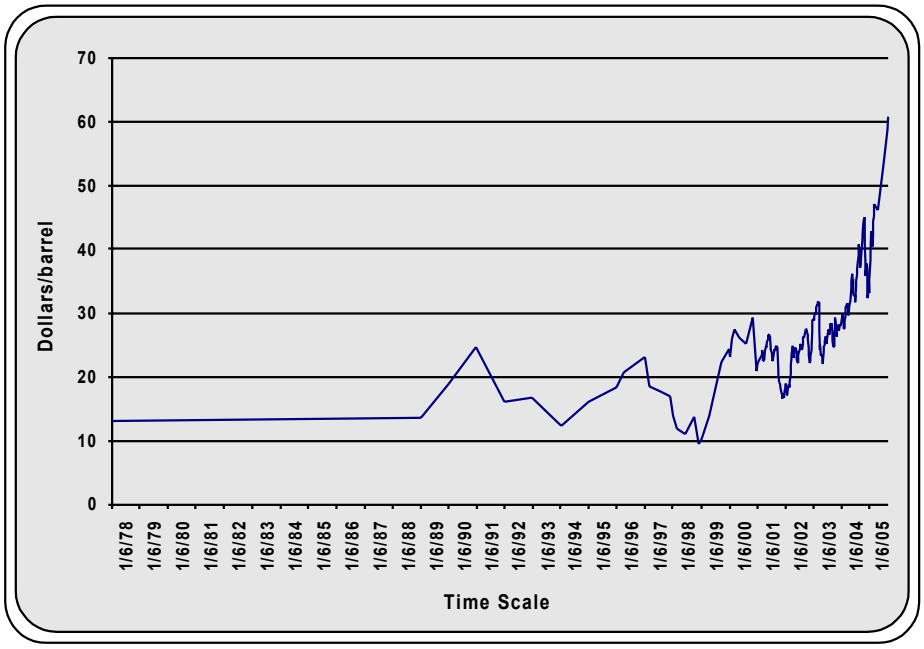
[10] See: *Annual Report 2003-04*, Ministry of Petroleum, Govt. of India, available at [http:/petroleum.nic.in].

Global Energy Outlook

The world is encountering a nigh daily growing demand for fossil fuels, largely emanating from developing economies, to such an extent that a significant change is already being witnessed on the energy market. The coming decades will see an increasing interplay between pricing and the geopolitical and technical factors governing the energy scenario. Global primary energy demand will increase from 9.1 billion tonnes of oil equivalent (btoe) in 2000 to 15.3 btoe by 2030.[11] The contribution of oil will remain significant, followed by coal, together constituting nearly 60 percent of the total primary energy mix. Oil will see the bulk of its demand arising from the transportation sector, whereas coal will contribute more to electric power generation, especially in developing countries. The coming century will see an increase in natural gas as the most preferred source, since it is competitive both in

Figure 2

World Oil Pricing (1978-2005)



[11] See: *World Energy Outlook 2002*, p. 58, available at [http://www.iea.org].

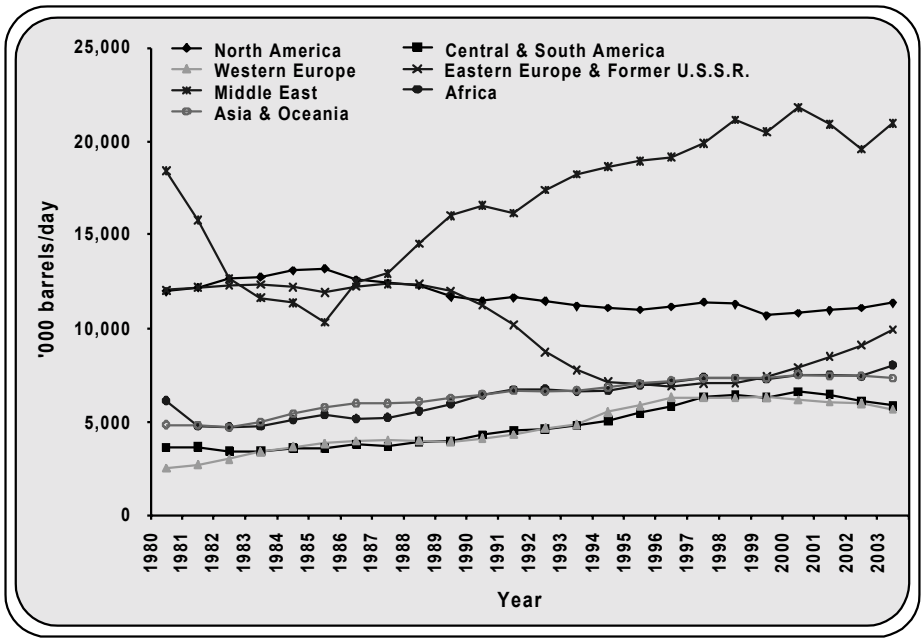
the transportation and the power engineering sectors. And its sectoral share will not only surpass coal by 2010, but might even supersede oil by mid-century. Already the demand for natural gas is rising the fastest, with an annual growth of 2.4 percent compared to oil's 1.6 percent. Another significant advantage of the shift toward natural gas is its low CO_2 emissions.

Most of the world's primary energy demand is expected to come from developing economies. The OECD and transition economies will together constitute no more than 40 percent of the total increase in global demand. However, their absolute share in gross consumption will remain high, close to 60 percent. China and India together will account for 45 percent of the total global coal demand by 2030. North America and OECD Europe will witness a faster growth rate in gas consumption. Japan, Korea, and the developing Asian countries will also witness a significant increase in nuclear power generation capacity. The share of electricity consumption is bound to grow fastest among all the final forms of energy. A growth rate of 2.4 percent per year is expected in the next two decades. Its demand is expected to rise by 4.1 percent in the developing countries, by 2 percent in transition economies, and by 1.5 percent in OECD. But nearly a third of the earth's population will still find itself in need of electricity, even as late as 2030.[12]

The pricing of petroleum products is one of the most crucial aspects when estimating the time span for adjusting to any new options. A hike in price of just a few dollars is enough to make us conscious of conservation technologies and search for viable alternatives. But, after adjusting to the new

Figure 3

World Crude Oil Production (1980-2003)



[12] See: *World Energy Outlook 2002*. Foreword.

price levels, the tendency to relax creeps back in. However, the emerging economies, especially India, can't afford inflationary pressure which eats up their modest growth benefits. The prospect of world oil prices slowing down the growth rate of emerging economies has worried India and other countries too. The recent upswing in crude oil prices has already given rise to inflationary pressure and inflation of the import bill. If we look at the price movement in Fig. 2 and Fig. 3, we see that at the beginning of the 1990s these indices fluctuated within a certain price range, rising to almost $25 per barrel, then dipping once more to the previous low of $13-15 per barrel. Throughout the 1990s, there were periods of low and high prices spanning over the decade. This century has witnessed a more or less jagged climbing of oil prices, almost exceeding $60 per barrel. The nearly 400 percent increase in prices is even more glaring considering the cost of crude oil production, which comes to less than $3 per barrel.[13] The 1990s have much to reveal about the geo-economics of oil pricing. The price fluctuations, like a double-humped Central Asian camel, hint that mobilization efforts are underway to create a common policy group of OPEC and non-OPEC producers on international oil pricing. Stable production from the Middle East since 2000 has helped to generate more favorable winds for the commercial exploitation of Eastern Europe and Former Soviet Union (EE/FSU) energy reserves.

Energy from Central Asia

Most of non-OPEC production comes from the North Sea, FSU, including the Central Asian Republics, other states, such as Oman & Yemen, Brazil, and Columbia, and a few Southeast Asian nations. Together they constitute an expected share of 43 percent of potentially exploitable resources by 2025. Of this, the FSU will hold a nearly 30 percent stake in overall distribution. The outlook for growth in Russia's oil production is slightly more optimistic according to the *IER 2005* as Russian companies continue to surprise industry experts with productivity increases in Western Siberia and the resource-rich Caspian Basin.

Central Asia and the Caspian Sea region are the oldest oil-producing regions in the world. Commercial production dates back to the 1870s when the first oil well commenced production in Baku. By 1900, nearly 3,000 oil wells had already been drilled in Azerbaijan. The first offshore oil rig was installed in 1924. According to some estimates, the proven offshore oil reserves range between 17-39 billion barrels. The gas reserves are estimated at 177-182 trillion cubic feet (tcf). They constitute 2 and 5 percent of the world oil and gas reserves, respectively.[14] Territorial control over these reserves is shared among Russia, Kazakhstan, Turkmenistan, Iran, and Azerbaijan. Located internally, the search for a transportation network has been a critical condition for further development of these reserves. A geological survey of the region divides the basin into the north and the south Caspian basins. The east flank of the basins is interlocked with other smaller basins, the North Ustiurt, Mangyshlak and Amu-Darya basins. The north Caspian basin is an extended continental shelf mostly situated in Kazakhstan. It has some of the largest oil-bearing fields: Tengiz and Karachaganak, both onshore, and Kashagan, an offshore deposit. The South Caspian basin, which is largely under water, consists of thick sedimentary deposits exceeding 20 km.[15] The high sedimentation pressure favors the longer drilling life of the well.

[13] See: Energy Information Administration, U.S. Govt., *International Energy Outlook 2005*, p. 31.

[14] See: P. Rabinowitz, *et al*., "Geology, Oil and Gas Potential, Pipelines and the Geopolitics of the Caspian Sea Region," *Ocean Development & International Law,* Vol. 35, 2004, pp. 19-40.

[15] See: Ibidem.

Kazakhstan is the leading producer of marketable oil in the region. It has proven reserves of 6-8 billion barrels.[16] Uzbekistan has modest oil reserves of 0.6 bbl. However, Central Asia is essentially a gas-producing region. Its proven gas reserves amount to 6.6 trillion cubic meters.[17] Nearly half of them belong to Turkmenistan. The rest is primarily shared by Uzbekistan and Kazakhstan. There is an order of preferences among the CARs owing to their proximity to Russia and China, and also to the U.S. This has stood as a major hurdle to creating a collective market for their resources. Another major problem has been timely payments due to the complicated system involving transit party, supplier, and consumer. This three-tier payment system has discouraged the export of resources to new areas. Obviously, efforts are being made to diversify by means of newer pipelines. While Kazakhstan is interested in looking toward China for that matter, Turkmenistan is keen to work with Iran, Georgia, and Turkey.

Routes and Markets

The landlocked status of Central Asian energy resources has been a strong factor in linking the fields and their potential markets. These resources are primarily concentrated in Azerbaijan, Kazakhstan, and Turkmenistan. Azerbaijan and Kazakhstan are strong in oil resources and Turkmenistan leads in gas potential. Recently, the discovery of an offshore gas field at Shah Denis has put Azerbaijan on the gas map too. The Kashagan block developed by the Offshore Kazakhstan International Operating Company (OKIOC) has added another 40 billion barrels to Central Asia's reserve chart.[18] Central Asia's energy resources have been traditionally marketed through the FSU's pipeline networks (Fig. 4). The Novorossiisk port on the Black Sea is still a vital maritime terminal for them. The sea route is fairly mature, and there are several pipelines which have been additionally planned under various considerations. One of the key geopolitical objectives has been to reduce sole dependence on the Russian network. The U.S. is particularly keen to divert the Azeri Caspian resources through Georgia and Turkey. This proved a direct threat to Russian interests. However, several logical decisions need to be made prior to its actual materialization. This not only depends upon the amount of investment needed, but also on the length of time sufficient delivery volumes can be guaranteed. Another vital factor is that alternative pipelines will have to pass through conflict-prone regions.[19] The Nagorno-Karabakh conflict has been detrimental to all pipeline decisions. There is also the issue of common pooling of resources, which requires that a common understanding be reached between several exploration companies and their host nations. These complex interests have turned the western and northern routes into geopolitical fault lines of the Caucasus.

Russia and Iran are another energy-exporting nations, the territory of which is contiguous to Central Asia's energy reserves. Their geopolitical encirclement of Central Asia's resources makes them doubly effective both as alternate energy options and vital transit routes for third party consumers. Owing to the dwindling North Sea energy resources, the Central Asian Energy Resources (CAER) offer a competitive alternative to Middle East oil. What is more, the high living standards in OECD Europe and concomitant need for high-calorie fuel sources to lower power consumption in the overall

[16] See: J. Dorian, "Energy Resources in Central Asia," in: *Challenges and Opportunities in Energy*, Asian Development Bank, The Philippines, p. 30, available at [http://www.adb.org].

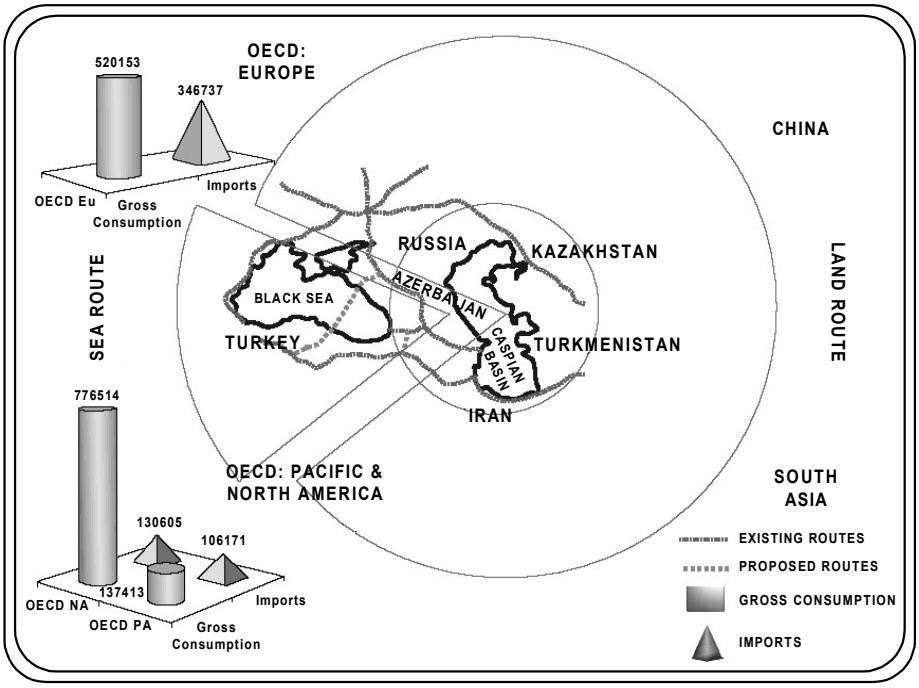
[17] See: Ibidem.

[18] See: G. Baghat, "Pipeline Diplomacy: The Geopolitics of the Caspian Sea Region," *International Studies Perspectives,* No. 3, 2002, p. 313.

[19] See: Ibid., p. 320.

Figure 4

Energy Reserves and Potential Markets



economy have made natural gas a strong competitor of oil in industrial production. This has raised the stakes for Central Asian Gas (CAG) on these markets. Russia has tapped this situation well and has been extending its network through Eastern European countries to these markets. This has also given OECD Europe considerable leverage vis-à-vis the U.S., which meets nearly all of its natural gas demands on the continent, mainly by means of Canadian supplies. Iran has been richly endowed in oil, as well as natural gas resources. It offers the shortest possible sea access to the Persian Gulf coast for international marketing. However, the U.S. presence in Iraq and the continuous hobnobbing over the nuclear issue has made this route dependent on the geopolitical climate. But the collective strategy adopted by Iran, China, and Russia is paying dividends. Iran has entered into oil swap agreements with Kazakhstan and Turkmenistan, which is helping them to overcome the financial and geopolitical difficulties.

Two new potential markets for CAER are the emerging Asian economies, China and India. So far, these economies have no direct access to these resources. At the beginning of the post-Soviet era, CAER were perceived as being disengaged from their past political economy. A new view emerged at the behest of the U.S., when these resources were felt to be brought closer to the warm waters of the tropical oceans, i.e. the Arabian Sea. India has shown hardly any inclination to bring these resources to South Asia. The obvious reason was India's imbroglio with Pakistan over Kashmir. Any thought of

undertaking such a venture could only mean the route passing through Pakistan. Besides, all the oil imports have been maritime, hence India still relied heavily on the Middle East as a source in terms of cost-benefit. However, the pipelines turned out to be nothing more than an empty dream, since Russia, China, Iran, and other countries were collectively proving to be equipotential alternatives to Central Asian resources.

Transportation channels had to be created due to its interior location. The existing infrastructure mainly connected these resources to Russia, the rest of the CIS, and Eastern Europe. Therefore the proposal was mooted after the advent of the Taliban to channel Turkmen gas via Afghanistan and Pakistan either to the ports or the main market in South Asia, i.e. India. The U.S. favored the South Asian route, since it was considered an extra opportunity to trounce Russia at its behest. India's geostrategic interest in Central Asia rose either way due to competitive vying for a vast market in its vicinity capable of consummating its energy security interests. This vying of interests coincided with the gradual transformation of Indo-Pakistani relations. But Afghanistan and Pakistan still have much to do to generate ample investment interest. Unocal's withdrawal is a good case in point. India has done nothing but benefit in the aftermath of the 11 September, 2001 attack, since the U.S. was compelled to intervene as an active party in forming the geopolitical climate. India was hoping to gain at the latter's expense as it attempted to link Pakistan's and Afghanistan's state interests to mainland South Asia. Alternatively, India has also been looking at making swap arrangements with Iran. In fact, this is considered to be the most pragmatic step from India's point of view. India's needs must be modified a bit here. LNG imports will be more suited to its needs than laying a pipeline in the Arabian Sea. The U.S.'s attitude toward Iran is still a geopolitical caveat to these developments.

India's Security Options: A Shifting Paradigm

India's energy security must look for a multi-pronged approach in order to sustain the transition path in the coming decades. This approach must account both for the supply and production aspects and for the final forms of consumption. Global energy geopolitics requires that strategy be drawn up which ensures long-term needs. One of the immediate key steps taken by the government was to ensure a stake in the global energy market by acquiring overseas oil equity; sometimes equity oil is envisaged as part of the agreement. Both cases are meant to reduce the impact of a global escalation of oil prices. ONGC Videsh Limited (OVL) is a subsidiary of ONGC with a "mandate to undertake overseas projects on the exploration and production of petroleum and other petroleum products in order to augment the country's oil security and buy equity oil from its overseas ventures." OVL has acquired either fresh or already existing production capacities in Vietnam (gas), Russia (oil and gas), and the Sudan (oil). Oil from the Sudan has begun to reach India. Sakhalin oil is expected to arrive soon. India is also party to interests in Iran, Myanmar, Iraq, Libya, and Syria.[20] This quickening pace of diversification will help India to disperse its security load over numerous newer sources apart from the Middle East. However, there is the fear that efforts to draw CAER toward South Asia might lose momentum in this mêlée. But sustained interest from Iran and Pakistan can help maintain the cause for mutual benefit. There is also competitive vying for overseas coal fields. This multi-form of acquisition of overseas energy reserves is bound to pave the way for strengthening security facets.

[20] See: *Annual Report 2003-04*, Ministry of Petroleum, Govt. of India, pp.17-18.

The second major strategy in the long-term perspective is to increase electricity generation, accelerating it as much as possible by increasing the production capacity of nuclear power plants. The Nuclear Power Corporation of India (NPCIL) is responsible for expanding nuclear power generation capacity. At present, it is running fourteen (two using boiling water, and 12 pressurized heavy water (PHW)) reactors with a total generation capacity of 2,770 MWe. In addition to these, the NPCIL has also undertaken the construction of eight (6 PHW and 2 light water) reactors, which expand its total generation capacity to 3,960 MWe.[21] According to Anil Kakodkar, metallic fuels have a short doubling time and can ensure a sufficiently fast increase in nuclear installed capacity. As part of the synergy action plan, the Bhabha Atomic Research Centre (BARC) is working on a Compact High Temperature Reactor as a source of hydrogen, which will be an important energy carrier in future.[22]

The third strategy focuses on the final forms of consumption, especially in the rural sector. India's primary non-commercial energy consumption (42%) is almost as high as its commercial consumption (58%). The former primarily constitutes rural household and non-industrial demand. Hence, in rural areas more than 90 percent of the energy demand is met by means of Combustible Renewable Wastes (CRW). This energy gap between rural India and its urban areas is posing a huge threat to India's energy security. A significant shift from CRW in the rural scenario could possibly be compensated for by an increase in LNG as a source of fuel for domestic cooking and heating needs. CRW account for 54 percent of the total final consumption, which is far greater than China's 25 percent or even Thailand's 22%, a country in which nearly 80 percent of the population is rural.[23] Nearly 2/3 of CRW consist of bovine dung cake and crop residues; although there is increased use of kerosene and LNG in rural areas, the share of CRW has not declined. The average growth in CRW demand is expected to remain below 1 percent, hence by 2020 their overall share is expected to remain at 25 percent. But this requires a shift in industrial demand toward rural demand. Rural electrification and increased commercialization of agriculture will demand more energy input. This demand can only be met by immediately building more thermal power stations and increasing the capacity of nuclear power plants.

Epilogue

Development is an overarching concern which is undergoing a new spurt in light of the recent efforts during the last decade to promote liberalization and implement growth-oriented policies. Both the people and the present government of India have a consensual desire to achieve satisfactory economic indicators. Food safety, eliminating poverty, creating jobs, and transforming rural India seem to be the policy vision for the current century. "Bharat Nirman," if it ever comes to fruition, will have to have the Gandhian motto of providing development opportunities for the most downtrodden, weak, and poor. And no doubt this giant turning of wheel can only be accomplished by the sustained input of human, material, and energy resources. India's energy security will bear this preamble to charter out all its future needs and strategic initiatives.

India is perhaps the largest and most attractive destination for Central Asian energy resources, as it is the only market of its size close to the source. India's quest for energy security has become a multi-tier approach. The external component of energy production is mainly confined to transportation needs. However, Central Asia's gas resources offer an opportunity to extend this input to elec-

[21] See: Executive Summary of *Annual Report 2004-05*, Atomic Energy Commission, Govt. of India, p. 1, available at [http://www.doe.gov.in].

[22] See: Ibid., p. 12.

[23] See: *World Energy Outlook 2000*, p. 321.

tricity generation for industrial use. But, in addition to the economic, this must also be a geopolitical decision. Can India sufficiently adjust its developmental pace to external factors in such a delicate situation where Pakistan and Afghanistan will be involved? The second option may be to think about transmitting electricity such long distances instead of gas. So far, there is no common South Asian grid which could be linked to a potential Central Asian grid. The question arises of how and to what extent the destinies of the Asian communities can be interwoven. They have their distinctive Asian heritage in common. Can a poverty-ridden South Asian society seek amelioration from a Central Asian or West Asian society? Or can a West Asian society seek a way to diversify its energy needs in a non-Eurocentric world through trade and other forms of commerce? These are all levels of maturity for a truly global society, in which regional consolidation is also a vital component. Without it, it will be impossible to join together the hexagonal patches from which the giant football, the Earth, is formed.