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'Energising' India's Development through Economic Diplomacy

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Introduction

Since the turn of the present century one issue that has seriously engaged policy makers worldwide is the construction of modalities of regional cooperation for sharing energy, the most vital of all resources. The International Energy Agency (IEA) in a 2007 report has warned that if governments around the world stick with current policies, the world's energy needs in 2030 would exceed today's requirements by well over 50 percent; about 45 percent of this increase would originate from Asia's fast growing giants, China and India.

Regional energy cooperation is a potential means of attaining greater economic cooperation amongst proximate countries; however it involves various factors which determine the changing scope and dynamics of regional economic relations. It is indisputable that the energy starved yet booming Indian economy needs to tap every possible source of energy that is economically viable. This involves expansion of its domestic energy resource base and the discovery of new sources. Moreover, India must pursue technologies that maximize energy efficiency involving suitable demand side management and conservation strategies. In short, India has to formulate a domestic energy policy and blend foreign/trade policy with energy diplomacy to develop relationships with foreign energy suppliers.[1]

One of the important elements of China's foreign policy, under the new leadership on Hu Jintao is to seek foreign energy sources for satisfying its burgeoning developmental needs by establishing closer ties with energy-abundant countries that have had relatively limited interactions with it in the past. This approach for obtaining a stable and secure energy supply from different countries through cooperative and peaceful means is described by many experts around the world as "energy diplomacy," [2]

On the lines of China many countries, including India, have started pursuing energy diplomacy to seek energy supplies from the energy rich countries of Asia, Africa and South America. In this context, regional economic cooperation is considered a more fruitful and secure way than bilateral moves. It is in this context that the present paper seeks to find out why and how India should engage increasingly in energy diplomacy.

Sources of Energy

Energy sources can be divided into two broad categories: renewable and non-renewable resources. Renewable sources are those which are characterised by a natural rate of recharge. Non-renewable sources, on the contrary, are not characterised by any recharge. Renewable resources can be classified into exhaustible resources, such as water, which get exhausted if the rate of use exceeds the rate of recharge over a long period of time, and non-exhaustible resources such as solar energy.

Coal, currently the most significant source of global energy, is non-renewable along with petrol and gas. Solar, tidal, wind and possibly nuclear power are both renewable and non-exhaustible. Hydro sources are renewable but exhaustible. As shown in Diagram 1, in 2005 nearly 81 percent of the global energy supply came from hydrocarbons (i.e., oil 35%, coal 25% and natural gas 21%) while the rest was sourced from nuclear (6.3%), hydro (2.2%) and other sources.

The global distribution of hydrocarbon reserves reveals that the OECD countries command major shares. Developing countries, which lack hydrocarbon reserves, have become heavily dependent on foreign countries for supplies of these resources. The production data for 2006 from IEA (Table 1) reveals that about 1/3rds of global production of crude oil was from Saudi Arabia (12.9%), Russia (12.1%) and USA (7.9%).) taken together. In 2006, Saudi Arabia (16.7%), Russia (11.6%) and Iran (6%) together accounted for 35% of total crude oil exports.

The three largest producers of hard coal in 2006 were China (46.2%), USA (18.4%) and India (7.9%) while largest hard coal exporters during the same year were Australia (28.3%), Indonesia (15.8%) and Russia (11.3%). The largest producers of natural gas in 2006 were Russia (22%), USA (17.6%) and Canada (6.4%). The largest exporters of natural gas in 2006 were Russia (23%), Canada (11.5%) and Norway (9.8%).

The largest nuclear electricity producers in the world in 2005 were USA (29.2%), France (16.3%), Japan (11%), Germany (5.9%) and Russia (5.4%). These five developed countries accounted for more than 2/3rds of global nuclear electricity production in 2005.

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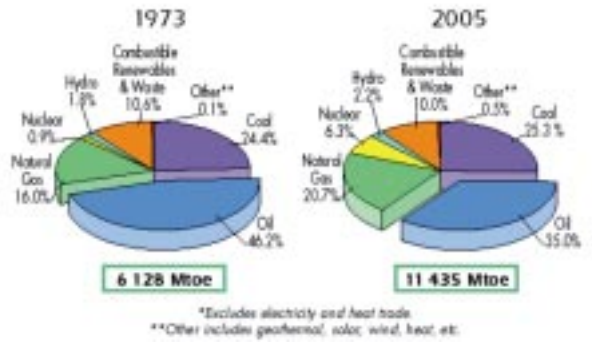
Figure 1: 1973 and 2005 Fuel Shares of TPES*



Source: Adopted from International Energy Agency (IEA) 2007: Key World Energy Statistics 2007, p.8

India's Current Energy Situation

India has one of the lowest levels of per capita energy consumption. India consumed 439 kg of oil equivalents (kgoe) of primary energy per person in 2003 compared to 1090 by China, 1094 by Brazil and 5805 by Saudi Arabia, while developed countries consumed even higher amounts per capita: 7835 kgoe by USA and 3906 by UK . World annual energy consumption stood at 1688 kgoe per capita (Table 2). Table 3 shows that India's projected level of per capita energy consumption in 2032 is less than 74 percent of the world average in 2003.

The per capita consumption of electricity is the most common criterion used to evaluate the level of economic development of a country and by this criterion India's position denotes a low level of development. India's per capita electricity consumption in 2003 stood just at around one-fifths of the world average (553 against 2429 kgoe) while it was just 40 percent of the Chinese level , 29 percent of the Brazilian level and just 4 percent of the US level. [3]

Demand Scenario

The Indian Planning Commission has estimated that in order to achieve at least 8 percent economic growth from now to 2031-32 and to meet the lifeline energy needs of all citizens the country will have to increase primary energy supplies by 3 to 4 percent per annum during this period, and electric generation capacity/supply by 5 to 6 times of its 2003-04 levels. It is estimated that power generation capacity would have to be raised to 800,000 MW by 2031-32 from the current level of 160,000 MW.

Supply Options[4]

Non-Renewable Resources

Coal: India's proven reserves of coal, its most abundant mineral resource, can last for about 80 years at the current level of consumption. However, if all the potential reserves also materialize then coal and lignite can last for over 140 years at the current rate of extraction; with a higher 5 percent annual rate of increase in the production of coal and lignite, the extractable coal reserves would, however, run out in around 45 years.

Oil and Gas: The reserves of crude oil are merely 786 million tons, which, at the current rate of exploitation, can last for 23 years. Crude oil production has stagnated and the gap between demand and domestic production of crude oil has been widening, forcing the country to import increasing amounts from international sources. India was the sixth largest importer of crude oil in 2005 with imports of 99 million tons out of total global imports of 2256 million tons.

Until 2001-02 no major natural gas reserves had been discovered in the country; however, after discovery of the Krishna-Godavari basin gas reserves and other sources, it is now estimated that the country's resource base for Coal Bed Methane (CBM) lies between 1400 BCM (1260 Mtoe) and 2600 BCM (2340 Mtoe).

Uranium: Indian current extraction of uranium is low. Uranium Corporation of India limited (UCIL) will invest about Rs. 31 billion ($679 million) to open new mines and set up processing plants in Jharkhand, Andhra Pradesh, Meghalaya and other regions. The Department of Atomic Energy is spearheading

Table 1: The largest producers and exporters of energy resources in 2006
(Percentages of global total in parentheses)

Production			Exports		
Oil	**Hard Coal**	**Natural Gas**	**Oil**	**Hard Coal**	**Natural Gas**
S.Arabia (12.9)	China (46.2)	Russia (22)	S. Arabia (16.7)	Australia (28.3)	Russia (23.0)
Russia (12.1)	USA (18.4)	USA (17.6)	Russia (11.6)	Indonesia (15.8)	Canada (11.5)
USA (7.9)	India (7.9)	Canada (6.4)	Iran (6.0)	Russia (11.3)	Norway (9.8)
Iran (5.5)	Australia (5.7)	Iran (3.3)	Nigeria (5.0)	S. Africa (8.5)	Algeria (7.3)
China (4.7)	S. Africa (4.5)	Norway (3.1)	Norway (5.0)	China (7.7)	Netherlands (6.2)
Mexico (4.6)	Russia (4.4)	Algeria (3.0)	Mexico (4.6)	Columbia (7.3)	Turkmenistan 5.6)
Canada (3.8)	Indonesia (3.1)	UK (2.8)	Venezuela (4.5)	USA (5.5)	Indonesia (3.9)
Venezuela (3.8)	Poland (1.9)	Netherlands (2.6)	UAE ((4.5)	Canada (3.3)	Malaysia (3.5)
Kuwait (3.5)	Kazakhstan (1.9)	Indonesia (2.4)	Kuwait (3.8)	Kazakhstan (3.2)	Qatar (3.5)
UAE (3.7)	Colombia (1.2)	Turkmenistan (2.3)	Canada (3.8)	Vietnam (2.7)	USA (2.3)
ROW (37.8)	ROW (5.9)	ROW (34.5)	ROW (31.5)	ROW (6.2)	ROW (23.4)

Source: Author's calculations based on the data in International Energy Agency (IEA) 2007: Key World Energy Statistics 2007

Table 2: Selected energy indicators for 2003					
Region/Country	GDP Per Capita-PPP (US$ 2000)	TPES Per Capita (Kgoe)	TPES/GDP (Kgoe/ $2000PPP)	ECPC (kWh)	ECPC/GDP (KWh/ $2000 PPP)
China	4838	1090	0.23	1379	0.29
Australia	28295	5630	0.20	10640	0.38
Brazil	7359	1094	0.15	1934	0.26
Denmark	29082	3852	0.13	6599	0.23
Germany	25271	4210	0.17	6898	0.27
India	2732	439	0.16	553	0.20
Indonesia	3175	753	0.24	440	0.14
Netherlands	27124	4983	0.18	6748	0.25
Saudi Arabia	12494	5805	0.46	6481	0.52
Sweden	27869	5751	0.21	15397	0.55
United Kingdom	26944	3906	0.14	6231	0.23
United States	35487	7835	0.22	13066	0.37
Japan	26636	4052	0.15	7816	0.29
World	7868	1688	0.21	2429	0.31

TPES: Total Primary Energy Supply
ECPC: Electricity consumption per capita
Source: International Energy Agency (IEA) (2005) Key World energy Statistics 2005, International Energy Agency, Paris. http://www.iea.org

the efforts to find new uranium deposits across the length and breadth of the country to ensure that uranium supplies should not become a hostage of the India-US civil nuclear supplies agreement, if it doesn't come through.

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Renewable Energy Resources

Limited availability of the non-renewable energy sources should force India to develop its renewable energy resources. It may be noted, however, that such development requires vast expanses of land and huge financial resources. While land is scarce the requirements for financial resources can be met only through international investments.

Hydro Electricity: The expert committee on integrated energy policy reports that the total hydel resources are estimated at 84,000 MW at a load factor of 60 percent. The current utility based installed capacity is 32,326 MW and the annual generation during 2002-05 was 74 Billion Kilowatt hours (BkWh) corresponding to a load factor of 29 percent. At such a load factor an installed capacity of 150,000 MW may be justified, given the available potential hydroelectric energy. The latent hydro potential is mostly concentrated in the North East, Uttaranchal and Himachal Pradesh. In addition there are possibilities of importing hydropower from Nepal and Bhutan, whose combined economically feasible potential is estimated to be in excess of 55,000 MW.

Wind Energy: Onshore wind energy potential is estimated to be around 45,000 MW, which would contribute below 10 Mtoe to the India's energy mix.

Biomass, Biogas and Bio Fuels: Biomass is the major domestic fuel used for cooking and consists mainly of agricultural by-products and gathered wood. Domestic biomass use in 2000 was 80 Mtoe. Biomass could become a major energy source if fuel wood plantations are developed. This requires land, which may have other competing uses

Bio-diesel is a natural diesel substitute. Bio-diesel can be obtained from non-edible oils such as Jatropha, Karanj, and Mahua etc. Ethanol is extensively used in Brazil as a fuel for cars; however in India it is not expected to be a major transport fuel in the near future.

Solar energy is associated with costly technology and therefore may not be a significant source of energy in India in the next few decades.

Global Energy Demand and Supply in 2031-32[5]

The International Energy Agency (IEA) has projected a growth of the world's primary energy needs by 55 percent between 2005 and 2030, at an average annual rate of 1.8 percent per year. The demand for primary energy would reach 17.7 billion tonnes of oil equivalents (toe), compared to 11.4 billion toe in 2005. Fossil fuels would continue to remain the dominant source of primary energy, accounting for 84 percent of the overall increase in demand between 2005 and 2030.

Table 3: Per capita energy requirements in selected countries (2003)							
	TPES (Kgoe)	Electricity Consumption (KWh)	Oil (kgoe)	Gas (cu.m.)	Coal (kg)	Nuclear (KWh)	Hydro (KWh)
India 2003-04	439	553	111	30	257 (375)	16	69
India 2031-32 (projected@8% GDP growth)	1250	2471	331	149	925(1388)	256	273
World Average (2003)	1688	2429	635	538	740	403	423
OECD (2003)	4668	8044	2099	1144	1651	1924	1076
U.S.A. (2003)	7840	13066	3426	2176	3410	2624	948
China (2003)	1090	1379	213	32	1073	32	215
South Korea (2003)	4272	7007	2264	627	1541	2570	101
Japan (2003)	4056	7816	2146	845	1247	1859	816

Source: Government of India Planning Commission (August 2006) "Integrated Energy Policy: Report of the Expert Committee", Table2.16, p.32

Oil would remain the single largest fuel though its share in global demand would fall from 35 to 32 percent.. The demand for coal would see the biggest increase, jumping by 73 percent in absolute terms, between 2005 and 2030, which will push its share in total energy demand up from 25 to 28 percent during the same period. Most of the increase in coal demand would come from China and India. The share of natural gas would see a modest increase from 21 to 22 percent between 2005 and 2030. Doubling of the use of electricity would increase its share in final energy consumption from 17 to 22 percent during the same period. It is estimated that massive investment worth $22 trillion in supply infrastructures would be required to meet the projected global energy demand.[6]

Table 4: Commercial energy requirements, domestic production and imports for 8 percent growth during 2031-32

Fuel	Range of Requirement in Scenarios (R)	Assumed domestic Production (P)	Range of Import (I)	Imports (percent) (I/R)
Oil (MT)	350-486	35	315-451	90-93
Natural Gas (Mtoe) including CBM	100-197	100	0-97	0-49
Coal (Mtoe)	632-1022	560	72-462	11-45
TCPES	1351-1702	387-1010	29-59	

Range of imports is calculated across all scenarios as follows:
Lower bound=minimum Requirement-Maximum domestic production
Upper bound= Maximum requirements-minimum domestic production.
Source: Government of India Planning Commission (August 2006) "Integrated Energy Policy: Report of the Expert Committee", Table 3.8, p.45.

India's Energy Demand and Supply in 2030-31

The Expert Committee on Integrated Energy Policy (Planning Commission, 2006) has projected that a scenario of sustained 8 percent annual economic growth rate over the next two decades could be consistent with an import dependence for energy in 2031-32 ranging from 29 to 59 percent (see Table 4 for fuel specific requirements).

On comparing energy demand and the available resource base it is abundantly clear that our hydrocarbon resources would be grossly inadequate to meet our future needs. It is essential to have a long-term energy policy with clear and aggressive energy diplomacy in order to secure reliable and adequate foreign sources of supply of energy.

Need for Economic Cooperation

It is abundantly clear from the above discussion that India's needs for energy, driven by India's quest to maintain its present rate of economic growth of around 8 percent per annum, would increase significantly in the future. The quest to meet these needs would depend on the following 4 major factors[7]:

- Much will depend on India's ability to locate and use existing domestic gas and petroleum reserves.
- The ability of the Indian political system to address certain structural deficiencies, which contribute to significant loss and wastage, is important
- The ability to adopt new and more energy efficient technologies
- India's ability to secure external supplies of energy

Of these four factors, we concentrate here only on the last one. We discuss below how energy starved countries across the world have interwoven energy diplomacy with foreign/ trade policies in their quest for seeking foreign sources of energy supply.

India is at present the sixth-largest energy consumer in the world. It imported 41 million tons (5% of global imports) of hard coal and 99 million tons (4.4% of total global imports) of crude oil in 2006. To sustain its current average annual growth rate of gross domestic product (GDP), it is estimated that energy consumption will need to be increased by about 4 percent per annum. India will thus have to depend heavily on external energy supplies.

Oil will continue to dominate the energy scene for the next two decades or so. India urgently needs to negotiate a free trade agreement with Gulf Cooperation Council (GCC). Cheap imports of natural gas and nuclear supplies are also required. To achieve its goal India needs to engage in regional diplomacy. India has already started talks with Iran and Turkmenistan to supply natural gas via a route going through Pakistan and Afghanistan. The Iran-Pakistan-India (IPI) Gas pipeline project (Box 1) is being negotiated and is expected to be commissioned soon. The Turkmenistan-Afghanistan-Pakistan-India (TAPI) Gas pipeline project is also being negotiated. In addition, India has decided to forge energy partnerships with countries such as Syria, Sudan, Myanmar and Bangladesh.

Central Asian countries such as Kazakhstan have agreed to supply hydrocarbons to India. Russia, a time tested ally of India, can play an important role as it has surplus energy resources and can also help make natural gas available from Central Asian Countries through its diplomatic power in the Shanghai Cooperation Council. Even, Nepal and Bhutan, who are surplus in hydroelectricity, can supply electricity to India.

India has signed a civilian nuclear energy supply agreement on 18th July, 2005 with the United States. Though its implementation has come up against political obstacles,

Box 1: Iran-Pakistan-India (IPI) Gas pipeline

In June 2005, India signed a $22 billion deal with Iran for supply of 5 million tons of LNG annually, with Iran agreeing to consider supply of an additional 2.5 million tons annually. As per the agreement, the 2,700-km IPI Pipeline will have a capacity of 54 billion cubic metres of gas per annum, with 32 billion cubic metres supplied to India and 22 billion cubic metres to Pakistan. The project is estimated to cost $7.6 billion. The construction is expected to start in 2009.

it is expected that the civil nuclear supply deal would help India meet some of its energy needs over the medium to long term by opening the doors for investment in the country's nuclear energy sector.

Energy Diplomacy

Regional economic cooperation has played and will continue to play an important role in interregional energy supplies. The European Union is a model that demonstrates how diverse countries can cooperate and pool energy resources. The establishment of the European Coal and Steel Community in 1951 by France, Germany, Italy, Belgium, Netherlands and Luxemburg provided the first ever case of regional cooperation in the energy sector.

The large blocs of South American integration, the Andean Community of Nations (CAN) and the Southern Common Market (MERCOSUR) facing problems relating to trade, however find energy to be a central axis for new attempts at integration.

Rivalry exists among many countries of Asia (China and India being the main competitors), Europe and the US over access to Central Asian energy resources, the area dubbed as the "hub of energy resources". China has already gained leadership in this context, being the first to enter into several agreements with many of these Central Asian and African countries through its foreign policy.

Conclusion

In its regional economic cooperation policy no focused attention on energy diplomacy has been paid by India despite energy shortages. It is high time that India sharpens its diplomatic skills for garnering energy supplies to satisfy its increasing needs. The Government of India should therefore concentrate on the following:

- Utilisation of political and strategic help from Russia to tap energy sources from Central Asian countries.
- Use of India-Brazil-South Africa (IBSA) forum to get coal from South Africa and technology from Brazil for making ethanol from sugarcane residue.
- Finalisation of the India-GCC FTA.
- Expediting the India-US civil nuclear supplies agreement
- Finalisation of Brazil-Russia-India-China-South Africa (BRICS) to criss cross various regional cooperation groupings such as IBSA, SCO, SAFTA, ASEAN, MERCOSUR etc. and help to seek reliable and secure energy supplies

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Endnotes

1 Government of India: Planning Commission (August 2006) "Integrated Energy Policy: Report of the Expert Committee", p.33

2 In fact energy diplomacy (*nengyuan waijiao*) is one of the three pillars of Chinese foreign policy introduced in 2004. The other two are: power diplomacy (*daguo waijiao*) and good neighbour diplomacy (zhoubian waijiao). See, Dr. James Tang (2006), "With The Grain Or Against The Grain? Energy Security And Chinese Foreign Policy in the Hu Jintao Era", The Brookings Institution, p. 12

3 These data show that India has one of the lowest energy intensities of output i.e. India appears to be quite efficient in transforming energy into output (see table 2 last column)

4 This section draws heavily from the Report of the Expert Committee on Integrated Energy Policy (2006), Planning Commission, Government of India

5 This section is largely based on the International Energy Agency (IEA) report, World Energy Outlook 2007

6 IEA: World Energy Outlook 2007, p.4

7 See, Sumit Ganguli (2005), "India needs energy, and the US", September, *mimeo*