
CHAPTER I

NATURE OF ENERGY PROBLEM

C H A P T E R - I

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1.1 INTRODUCTION :

In the recent past, the problem of energy supply has been assuming great significance all over the World, and particularly the third World countries. In the developing countries, the problem of energy supply has been assuming different dimensions. In the third world countries, it has assumed the greater intensity from the point of view of the constantly growing demand for energy with the rapid industrialisation programme undertaken by them and with the growth of the population. Ultimately, the problem faced by the developing countries amounts to a growing gap between the potential supply of energy and growth of demand at a very high rate. Naturally, solution lies in bridging the gap between the potential supply of energy and the growth of demand in future. Therefore now a days the problem has been engaging the attention of a number of scientists, technologists and even to some extent social scientists. The energy problem could be viewed from both global and national view points. From the global point of view, also there is a problem of how to meet the growing requirements for it.

1.2 CATEGORIES OF ENERGY SOURCES :

The energy sources of supply could be divided in two categories.

1) RENEWABLE SOURCES OF SUPPLY NAMELY,

- 1) Solar Radiation,
- 2) Water power for Mills,
- 3) Wind power
- 4) Tidal power
- 5) Geothermal energy (heat flow)
- 6) Food,
- 7) Fuel wood, including Charcoal.
- 8) Other plant fuel (alcohol from sugarcane,
Manico, Bagasse, Corn cobs)
- 9) Dung and other animal wastes.

2) Non-RENEWABLE OR STOCK SOURCES ,

- 1) Fossil Hydrocarbons,
- 2) Crude Oil,
- 3) Natural gas and natural gas liquids,
- 4) Coal, lignite, peat,
- 5) Tar sands,
- 6) Nuclear fuels
- 7) Uranium,
- 8) Thorium
- 9) Water power for electricity generation.
- 10) Geothermal energy (in heat traps)

(Nos.9 and 10 from Non-renewable category overlap
Nos.2 and 5 from Category of renewable sources)¹

With the economic growth of the developing countries, as stated earlier, the demand for energy is likely to increase at high rate and as such, the energy sources from both the categories are to be tapped and in case of non-renewable sources, the conservation measures will have to be adopted so as to close the gap between supply and demand.

CONVENTIONAL AND NON-CONVENTIONAL ENERGY SOURCES:

The Sources of supply could further be divided into the conventional (traditional) and Non-conventional sources of energy. Another way of classified energy is based on its nature of use, namely Commercial and Non-Commercial, in the traditional category from both commercial and non-commercial energy, viz. 'Firewood, Vegetable wastes and animal dung'. Since, they are supposed to be free and the user is not expected to pay any price for them, they are classified as Non-Commercial. But, with the growth of economy and with it the urbanisation these sources are expected to turn out to be commercial sources. The Commercial sources of energy on the other hand consist of coal, petroleum and electricity. They are commercial in the sense that, they are used in organised sector and they command a price and users pay

for them. According to recent data commercial energy accounts for over 50% of all energy consumption in India. While commercial sources of energy are generally exhaustible, exception being hydro electric power, non-commercial sources are renewable.

1.3 GLOBAL ENERGY

The Workshop on Alternative Energy Strategies (WAES) studied the problems of assuring a continuous flow of energy in the massive quantities. All modern societies need for continuity indeed for survival. The conclusions of this are worth quoting.

- 1) The supply of oil will fail to meet increase in demand before the year 2000, most probably the years between 1985 and 1995, even if energy prices rise. Additional constraints on the oil production will hasten this shortage, thereby reducing the time available for the action on the alternatives.
- 2) Demand for energy will continue to grow even if Government adopts vigorous policies to conserve energy. The demand growth must increasingly be satisfied by energy resources other than oil, which will progressively be reserved for uses that only oil can satisfy.

3. The Continuous growth of energy demand requires that energy resources be developed with utmost vigour. The change from the World economy dominated by oil must start from now. The alternative must require 5 to 15 years to develop and the need for replacement fuels will increase rapidly as the last decade of the Century is approaching.

4. Electricity from nuclear power is capable of making an important contribution to the global energy supply although worldwide acceptance of it in efficiency on a large scale has yet be established. Fusion power will not be significant before the year 2000.

5. Coal has the potential to contribute substantially to future energy supplies. Coal reserves are abundant but taking advantage of them requires an active programme of development by both producers and consumers.

6. Natural gas reserves are large enough to meet projected demand provided the incentives sufficiently encourage the development of extensive and costly inter-continental gas transportation systems.

7. Although the resource base of other fossils, such as oil sands, heavy oil, and oil shale is very large. They are likely to supply only small amounts of energy before the year 2000.

8. Other than hydro electric power, renewable resources of energy, for example, solar, wind power, wave power are unlikely to contribute significant quantities of additional energy during this Century at the global level, although they could be of importance in particular areas. They are likely to become increasingly important in the 21st Century.

9. Energy efficiency improves beyond the substantial energy conservation assumptions already built-in to our analysis, can further reduce energy demand and the narrow the prospective gap between energy demand and supply. Policies for achieving energy conservation should continue to be a key element of all future energy strategies.

10. The critical interdependence of nations in the energy field requires an unprecedented degree of international collaboration in the future. In addition it requires the will to mobilise finance, labour, research and with a common purpose never before attained in the time of peace and requires it now. (2)

1.4 INDIA'S CURRENT POSITION ON ENERGY FRONT :

The energy problem of India is not one of the supply and demand imbalance in oil only. In fact, In recent years, demand supply imbalance has been widening

rapidly in all commercial fuels basically because demand, for commercial fuels has been out growing, the supply at a very fast rate. In other words, the supply of all fuels has been rising but not adequately.

A serious handicap is meagre reserves of mineral oil in India only 0.3% of the World's known oil reserves. Of course, oil can never be a major source of energy. In India, quality and quantity in coal reserves is poor. Of the gap between the demand and the supply of electricity has been widening rather than being nearer to being closed. With the rapid industrialisation and mechanisation^{on} of agricultural operations the demand for power (Mechanical source of energy) has been growing rapidly. But on the supply side, there have been a number of constraints creating severe shortage and bottleneck in generation and distribution in hydroelectric power in the Country. Oil shortage too affects adversely the transport sector which accounts for 56% of total oil consumption in India. The shortage of coal affects severely generation of electricity and consequently over all economic development of the Country. The overall power shortage hits seriously the industrial sector and also affects adversely the agricultural breakthrough. The new strategy on the rural front, the millions of the rural poor, who have to spend anything upto 100

man days every year in gathering fuel wood for cooking purposes. A number of reports of the poor people eating uncooked soaked rice have been published. For the rural poor the shortage of the firewood is emerging as a permanent energy crisis.

1.5 ECONOMIC PLANNING AND ENERGY :

From the very beginning the Government of India seems to have been aware of the energy problem. Since the first Five Year Plan, the Government of India earmarked the amount to be spent on development of various sources of energy supply. During the First Five Year Plan, out of the total outlay, of Rs.1960 crores its 7.6 % i.e. Rs. 149 crores were spent on energy. Subsequently during the second and third Plan period, the actual outlay on energy increased to the tune of Rs.452 crores and Rs.1252 crores respectively. Similarly, the percentage of outlay on economic development during these two plan periods increased to 9.7% and further to 14.6 %. The growth of outlay on energy and its relative percentage in the total outlay further went on increasing during the subsequent annual plans (1966-69), and during the subsequent five Year Plans namely, Fourth (1969-74), Fifth (1974-79) and Sixth (1980-85). The actual outlays increased correspondingly to Rs.1212 crores, Rs.2932 crores, Rs.7400 crores and Rs.30751 crores. During the annual plans and subsequent five

year plans (Fourth and Fifth) the percentages of outlays on energy remained more or less 18% with marginal changes only during Sixth Five Year Plan. The expenditure on energy shot upto Rs.30751 crores, during the Sixth Five Year Plan period (1980-85) forming 28.1 % in the total outlay of the plan (For details refer to the following table No.1.1.

TABLE 1.1

TABLE No.1 PLAN EXPENDITURE ON ENERGY (Rs.crores)

Sr. No.	Plan	Total Outlay (Actual)	Outlay on Energy (Actual)	Percentage
1	2	3	4	5
1.	First (1951-56)	1960	149	7.6%
2.	Second(1956-61)	4672	452	9.7%
3.	Third (1961-66)	8577	1252	14.6%
4.	Annual(1966-69)	6625	1212	18.3%
5.	Fourth(1969-74)	15779	2932	18.6%
6.	Fifth (1974-79)	39426	7400	18.8 %
	Sixth (1980-85)	109292	30751	28.1

SOURCE : Plan Documents, Planning Commission
(Government of India)

The above table reveals that the Government of India's financial allocations to energy have been increasing in the recent past. All these financial

allocations can be taken as indicative of increasing awareness on the part of the Government of India regarding the seriousness of the energy problem. This awareness has become ^{intense} since 1973-74, because of the increased bills of imported petroleum oil and other products amounting to Rs. 1100 crores. Since then, the bill for imported petroleum oil has been increasing very rapidly i.e. in the year 1982-83 and the import bill on this account stood at Rs. 5622 crores. Barring some few years between 1982-83 and 1987-88 in which the import bills on account of imported crude oil have remained slightly lower than that for the year 1982-83. After 1986-87, the problem of increasing import bill of crude oil has come to the surface. The problem of increase in import bill has been compounded by growing shortage of foreign exchange. The following table Number 1.2 sheds light on the intensity of the shortage of domestic supply of crude oil products in relation to growing demand for them.

TABLE No.1.2
CRUDE OIL PRODUCTS IMPORTS

Sr.No.	Item	1987-88		1988-89		1989-90	
		Quantity	Value	Qty.	Value	Qty.	Value
1	2	3	4	5	6	7	8
1.	Crude imports	18.316	2958.45	17.332	2651.07	19.857	4034.41
2.	Fuel	3.729	861.84	6.044	1398.48	6.172	2021.28
3.	Lubri-cants	0.220	87.65	0.287	137.33	0.322	186.09
			3907.94		4187.28		6241.78

NOTE : Quantity in million tonnes and value in crores of Rs.

SOURCE: 1) The Hindu,
Survey of Indian Industry 1990
published in February, 1991, page 73.

The above table points to growing dependence on imports of crude and in value terms foreign exchange expenditure to meet, satisfy domestic requirements for them. The toughest challenge the country faces today is of meeting the ever increasing demand for energy. The basket of primary commercial energy in India consists of coal, oil, natural gas, electricity from hydal and nuclear. Oil and gas account of 18.6% in 1960-61 met 38% of energy demand at the end of 1989-90. The share of electricity has gone up marginally from 10% (1960-61) to 10.5% (1989-90). The share of coal has come down from 71.4% to 51.2% between 1960-61 and 1989-90. The above relative shares of different sources of energy clearly demonstrate a growing dependence on oil as an energy source. India consumed less than 3 million tonnes of petroleum products at the time of Independence. But, consumption in 1989-90 reached as much as 53 million tonnes. This consumption figure is estimated to touch 100 million tonnes marked by the year 2000 A.D.

1.6

ENERGY CRISIS :

As stated some where earlier the first oil shock was experienced in 1973 when the prices of crude oil shot up. The second shock was the 1978-79, when the price of crude oil went up to dollars 40 a barrel. The third one which we are presently experiencing has come

amidst the raging Gulf War. These shocks have consistently demonstrated a strong linkage between the energy sector and the rest of the economy. The first shock was countered by hiking the prices of petroleum products. While price hikes are effective in curbing consumption in the short run, considering the strategic role of oil in India, where more than 97% of petroleum products form essential inputs to the economy, the consumption adjusts to the original pattern, unless some concrete measures are taken in terms of finding alternative sources of energy. In order to achieve long term reduction in demand for petroleum products the entire energy basket inclusive of both commercial and non-commercial, and mainly petroleum, natural gas, coal, power, biogas, biomass and other alternative sources of energy need to be studied simultaneously, so that optimum energy mix can emerge consistent with the nation's demand and resources. (3)

1.7 SUBSTITUTION POSSIBILITIES :

Substitution of oil is possible only in select industrial sector and to some extent the domestic sector where change over to fuels such as coal, soft coal and biogas can be effected. However, the transport and domestic cooking sector will continue to be on oil for a long time to come. The areas where effective substitution can be made are in the power sector where coal can effectively replace oil and hydal power can replace coal and oil.

1.8 THE NATURE OF ENERGY PROBLEM IN THE RURAL SECTOR:

Out of the total energy consumed in India, 40% of it is being used in the rural sector of Indian economy. In the rural sector, the principal use of energy is mainly for cooking food. In view of the absence of alternative sources of energy, the requirement of energy of the rural population is quite tremendous. To satisfy this consumption requirement of the rural population up till now to a large extent the traditional sources of energy like fuel, wood, agricultural wastes and animal dung have been exploited.

With the growth of population and consequent growth of food requirement, fuel, wood is being used on a very large scale. The source of fuelwood being forest, since the beginning of the planned economic development the deforestation has been taking place at the faster rate. With the deforestation the rural ecological balance is being disturbed with the fast deterioration of forest area, the energy problem considered from the supply side is becoming an intense one. Again the use of dung for the meeting of energy requirement of rural population has created the problem of scarcity of organic manures which are being used for maintaining the fertility of the agricultural soil. Again in view of the growing demand for energy in the rural sector and destruction of the sources of supply, the scientific research and development has been directed towards finding out new resources and

conserving the existing resources of energy. From this point of view, alternative sources of energy like biogas, biomass will have to be developed and propagated among the rural masses. Many studies have pointed out that, unless such types of energy sources are being used on very large scale, one can not conserve the forest area and even develop the forest area which has been deteriorated in the recent past. From the ecological point of view, also the conservation and development of forest area must receive top priority and the measures will have to be directed towards making available the alternative sources of energy on a very large scale.

Many agencies like the Khadi and Village Industries Commission with the assistance of financing institutions and Central and State Government, have been trying to popularise the use of alternative sources of energy in the rural sector of the Indian economy.

The subject matter of the present study is dealt with keeping in mind the various dimensions of energy problem at the all India level and also at the regional level. I have selected the subject of 'Economic Benefits and Problems of Gobar-Gas Plants with special reference to the utilisation of the existing gober gas plants in Murgud town of Kagal Taluka in Kolhapur District as a case study. Before presenting the result of case study in the third and subsequent chapters, I intend to review the energy policy and recent developments in that regard in the following chapter.

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