National Energy Policy

I.I Background

In recognition of the importance of energy in socio-economic development, the Government of Bangladesh has given continuing attention to the overall development of energy sector. It involved survey, exploration, exploitation and distribution of indigenous natural gas; survey and exploitation of hydropower; survey of coal and peat; establishment of petroleum refining facility and distribution systems; and establishment of power generation plants and networks for transmission and distribution of electricity. During last two decades, about 20 percent of total public sector investment was allocated for the development of energy sector. Despite all these efforts per-capita consumption of commercial energy and generation of electricity in 1990 were 56 KGOE/year and 73 kWh/year respectively. Per capita consumption of commercial energy and electricity in Bangladesh is one of the lowest among the developing countries. In 1990, more than 73% of total final energy consumption was met by different type of biomass fuels (e.g. agricultural residues, wood fuels, animal dung etc.). In 1990 only 2.2% of total households (mostly in urban areas) had piped natural gas connections for cooking and 10% of households had electricity connections and only 3.9% of total households used kerosene for cooking. Shortcomings of the past energy development programmes and management practices are identified as follows.

(a) Due to shortage of capital it has not been possible to undertake systematic survey, exploration and exploitation of energy resources throughout the country. As a result, it has not been possible to ensure balanced development of energy resources of different zones of the country and balanced development of different sub-sectors of the energy sector.

(b) Necessary attention has not been given to formulate appropriate policies to encourage private sector participation in energy sector development programme to meet the shortage of fund

(c) Development programmes of energy consuming sectors (e.g. industrial sector) have been constrained due to shortage and unreliable supply of commercial energy.

(d) Energy agencies have not been operated and managed efficiently.

(e) Energy prices have not been set on a rational basis.

(f) Effective measures have not been taken to ensure rational use of energy.

(g) Unplanned use of biomass fuels are contributing to environmental degradation.

(h) Adequate attention has not been given to meet the total energy needs of rural areas. Adequate attention has not been given to undertake systematic research programmes to develop indigenous technological capabilities. Adequate attention has not been given to develop trained manpower for the efficient management of the sector.

In the above context the Government has decided to formulate National Energy Policy (NEP) to ensure proper exploration, production, distribution and rational use of energy sources to meet the growing energy demand of different zones, consuming sectors and consumers groups on a sustainable basis.

1.2 Objectives

The objectives of the National Energy Policy (NEP) are outlined as follows.

(i) To provide energy for sustainable economic growth so that the economic development activities of different sectors are not constrained due to shortage of energy.

(ii) To meet the energy needs of different zones of the country and socio-economic groups.

(iii) To ensure optimum development of all the indigenous energy sources.

(iv) To ensure sustainable operation of the energy utilities.

(v) To ensure rational use of total energy sources.

(vi) To ensure environmentally sound sustainable energy development programmes causing minimum damage to- environment.

(vii) To encourage public and private sector participation in the development and management of the energy sector.

2.0 EXISTING INSTITUTIONAL ARRANGEMENTS

In addition to the Planning Commission, different Ministries and agencies are involved directly and indirectly with the planning of commercial energy resources and biomass fuels as shown in the National Energy Policy 1995. Different Ministries and agencies involved with overall development and management of energy resources are shown in the same policy.

3.0 ENERGY RESOURCES

3.1 Primary Commercial Energy Resources

Presently known primary commercial energy resources of the country include natural gas, oil, coal, peat and hydro-electricity. Estimated quantity of known and exploitable commercial energy resources are shown in the policy. Potential reserves of primary commercial energy resources are also presented in the policy. The existing known reserves of commercial energy sources are very modest in comparison- 'lo-development needs of the country.

It is known that in Bangladesh the exploration for energy resources is neither comprehensive nor systematic. There are prospects for augmentation of reserves through systematic surveys and exploration, for which investment by the public and private sector is essential.

3.2 Primary Biomass Fuels

Biomass is defined as all organic matters produced by photosynthesis process in plant kingdom. Depending upon their characteristics and quality) biomass resources are used as food, fodder, building materials, fuel and manure. Only a fraction of total biomass is used as fuel. In Bangladesh, biomass fuels are obtained from three sources: Trees (e.g. woodfuels), Field crops (e.g. agricultural residues) and Livestock (e.g. animal dung). Land is the ultimate resource base that supports the production of total biomass resources.

Bangladesh Energy Planning Project (BEPP) made an approximate estimate of biomass fuels m from different type of land for the base year 1981 and the data are presented in the policy. As the biomass is produced near its production, for the plan development there is a need to assess the demand and regenerative supply of different biomass fuels specific to different locations (e.g. district/ thana /village etc).

3.3 Animal Power

There are about 10.3 million draught animals including 0.7 million cows. Milch cows are used for land preparation to meet the shortage of draught cattle. At present power tillers and tractors are used to meet the shortage of animal draught power. Energy need for these devices is accounted under agriculture sector.

3.4 New Renewable Energy Technologies are:

Mini-hydropower: According to the report of the Working Committee on Mini-hydropower Generation of Bangladesh, there is potential for producing 10 GWh of electricity annually.

Solar: The average daily solar radiation varies from 5.05 kWh/sqm in Winter to 8.76 kWh/sqm in Summer. At present solar energy is mainly used as a convenient and low cost means of drying crops, fish and salt. Some PV units have been installed in different parts of the country mainly for demonstration. Solar photovoltaic technology for the generation of electricity is being costly, its prospects are to be ascertained for specific end uses and locations.

Wind: Average wind speeds are low (less than 3 m/s). The prospect of wind power generation using low speed wind turbines in selected areas and for specific enduses.

Tidal and Wave Power: The prospects of tidal and wave power in coastal areas need to be assessed.

Imported Fuels

Total yearly import of petroleum fuels is about 2 million tonnes, of which about 1.2 million tonnes is imported as crude, while the import of refined diesel and kerosene account for rest. In comparison to this, indigenous production of liquid fuels (oil, natural gas liquid) is only about 2.5% total annual demand.

4.0 STATUS OF ENERGY CONSUMPTION

Primary Energy Sources

4.1. Use of Natural Gas

Energy balance table of the country in 1990 has been presented in a table of the policy. It may be observed from the table that in 1990, 34.5% and 65.5% of primary energy were supplied by commercial energy and biomass fuels respectively. Natural gas accounted for 21.4% of total fuel or 61.8% of commercial fuels.

So far 17 gas fields have been discovered in the country of which 8 gas fields are in operation. Their total recoverable reserve was 12.42 TCF and the remaining recoverable reserve as of June 1993 was 10.44 TCF is shown in Table 4.2. Maximum daily production capacity of the wells in 1993 was 644 MMCFD in comparison to average demand of 578 MMCFD. Peak gas demand was 760 MMCFD. The existing transmission network is capable of handling a throughput of 800 MMCFD.

Total consumption of natural gas in 1990 was 0.165 TCF, which was equivalent to 163 PJ (3.8 MTOE) and the consumption mix were as follows: power 47%, fertilizer 35%, industries 9%, domestic and commercial 9%. The consumption of natural gas has increased to 0.21 TCF (208 Pj or 4.87 MTOE) in 1993. The shares of different end users were as follows: power 44%, fertilizer 33%, industries 7%, tea garden and brick fields 9%, domestic and commercial 7%.

It may be noted that during 1993 total system losses of all the gas systems were 0.017 TCF (8% of total gas) in comparison to acceptable loss of 1.5-2.0%. All out efforts are to be made to reduce the system losses to acceptable limits.

4.2 Use of Biomass Fuels

Biomass fuels play an important role (contributed 65.5% of primary energy in 1990) in meeting total energy need of the country; but they are now being consumed beyond their regenerative limits. Unplanned and uncontrolled use of biomass fuels are causing environmental degradation.

In the foreseeable future there are limited prospects of increasing the supply of biomass fuels. On the other, hand it is not economically possible to substitute all the biomass fuels by commercial fuels. From environmental consideration there is a need to maintain the supply of biomass fuels within the regenerative limits and the demand of biomass fuels in excess of sustainable limits is to be met by commercial fuels.

In future, the demand of commercial energy will increase to meet the growing needs.of different end use sectors as well as to meet the demand exceeding their regenerative limits.

4.3 Use of Renewable Energy Sources

In 1990, 65.9% of total primary energy sources were supplied by indigenous renewable energy sources (e.g. biomass fuels 65.5%, and hydropower 0.4%). With the present state of technology, unavailability of land and paucity of exploitable hydropower there is very limited opportunity for further increasing the contributions of renewable sources of energy in meeting the total energy need.

4.4 Use of Imported Fuels

Of the total energy consumed in 1990, 87.2% was met from indigenous energy sources (e.g. natural gas 21.4%, hydropower 0.4%, biomass fuels 65.4%) and 12.7% from imported sources (e.g. petroleum fuels 11.1%, coal 1.6%).

Of the total petroleum product (about 2 million tonnes) consumed in the country, about half is imported as refined product, while about 1.20 million tonnes of imported crude is refined in Eastern Refinery Ltd. in Chittagong.

In 1993, total quantity of petroleum fuels consumed in the country was 1.9 million tonnes and the shares of different end uses were: transport 47.5%, domestic 24.0%, agriculture 13.0%, industry 12.0%, power 3.5%. Total amount of coal imported in 1990 was about 4,50,000 tonnes and was used mostly for brick burning.

5. Power

5.1 Power Generation Distribution & Consumption

Total installed power plants of the country is about 2600 MW of which 2100 MW is located in the East Zone and 500 MW in the West Zone. Of the total installed power plants, the effective operational capacity is about 1900 MW against the peak demand of about 1800 MW. Timely maintenance and replacement of old units have not been possible due to nonavailability of funds. As a result, it is difficult to maintain a reliable supply with reserve margin of only about 6% against desirable level of 20-25%. In case of emergency outage and/or major overhauling, the supply is managed by load shedding. In 1993, load shedding occurred for 268 days for a total duration of 621 hours. The situation may aggravate in future unless emergency measures are taken to increase the firm capacity by installing new power plants and by undertaking maintenance and rehabilitation of existing power plants.

Indigenous energy sources (e.g. natural gas, hydro) are used for the generation of power in the East Zone and imported petroleum fuels (e.g. Furnace oil LDO, SKO, HSD) are used to generate power in the West Zone. In order to minimize the effect of fuel cost on power generation, electricity generated in East Zone is transferred to the West Zone via East-West inter-connector established in 1982. The transfer capability of the inter-connector has almost reached its limit (450 MW). In order to maintain adequate and reliable power supply in the West Zone a second inter-connector was planned to be installed by 1992-93. However, it has been decided to be built over the Jamuna Bridge, which itself is expected to be completed by 1998. Power supply in the West Zone will be severely constrained till the second interconnector is established and new power plants are built in the West Zone.

In 1990, total electricity generation was 7732 GWh and fuel mix was as follows: hydro (11.4%), natural gas (84.3%) and petroleum fuels (4.3%). Total electricity generation in 1993 was 9206 GWh and the fuel mix was as follows: hydro, (6.6%), natural gas (86.6%), petroleum fuels (6.8%).

In 1993, the average tariff of BPDB was Tk. 1.90/kWh against the cost of supply of Tk. 2.47/kWh. As a result, the utility had to incur financial losses for each unit of power sold to the consumers.

Distribution of service connections in 1993 among the three utilities were as follows: BPDB 925,510 (43%), DESA 426,868 (19.8%), REB 798,441 (37.2%). Distribution of energy sales by the three utilities were as follows: BPDB 6906 GWh (including bulk sale to DESA and REB), DESA 2309 GVVh (including bulk sale to REB) and REB 652 GWh.

The consumption of electricity in 1993 in different enduse sectors was as follows: domestic (36.8%), commercial (11.8%), industrial (42.3%), irrigation (4.6%) and others (7.3%). During the period from 1982 to 1993 the share of domestic consumption of electricity has increased from 15.3% to 36.8%; whereas the productive use (commercial, industrial, agriculture) has decreased from 77.3% to 60.3%. In order to increase the contribution of electricity in economic growth it is necessary to increase the productive use of electricity.

5.2 Rural Electrification Programme

The overall programme of rural electrification is administered by the Rural Electrification Board; and the specific distribution system within a particular area is owned and managed by the respective Rural Electricity Co-operative known as Pallibiddyut Samity (PBS).

On the average, a PBS covers an area of 1500 km2 and 4 to 6 thanas (thana head quarter and adjacent rural areas). Total number of PBSs established up to 1993 was 40. Average investment costs of establishing a PBS during the period from 1986-1993 was Tk. 512 million/PBS.

The total installed transformer capacity of 40 PBSs upto September 1993 was 660 MVA as against the peak demand of 210 MW (using 0.8 as the factor of coincidence). Thus the capacity utilisation of the installed distribution network in terms of peak demand was only 33.8%.

In 1993, total number of consumers of REB were 7,98,441 and the mix of consumers was as follows: domestic 80.7%, commercial 12.9%, irrigation 3.8%, industry 2% and street lighting 0.6%. The total energy consumption in 1993 was 652 GWh and the shares of different categories of consumers were as follows: domestic 30.7%, irrigation 22.3%, industry 41.2%, commercial and other 5.8%.

Based on the REB standard of 4 km per village, the network now covers about 12,500 villages. Additional 2000 villages have been electrified by Bangladesh Power Development Board. Thus now roughly 21.3% of villages have electricity network.

5.3 Load Management

The annual load factor of the national electricity grid is about 57%. The characteristic of demand is such that the evening peak is very sharp. In order to improve the performance of the system, reduce investment as well as to rationalise the energy use there is a need to undertake appropriate measu res for the management of loads. Recently Government has decided to adopt some load management measures to reduce electricity consumption during peak hours such as early closer of commercial shops, prohibition of using irrigation pumps during evening peak hours etc. These measures are however, yet to be implemented fully.

5.4 System Losses

High system loss is a major concern for Bangladesh Power Sector. During the last twenty years overall losses including station auxiliary use have varied between 30.1% and 42.6% of gross generation. During this period losses at transmission and distribution* (T&D) level varied between 27.2% and 40.2% of net generation. A high proportion of losses at T&D level includes non-technical losses (e.g. theft, pilferage etc.).

Analyses of BPDB and DESA systems show that present T&D technical losses should be about 18% of gross generation, including transmission loss of about 5.4%. Thus total loss including station use should not be more than 23.4%. But in fiscal year 1993 the loss was 36.9%. Therefore, balance 13.5% of gross generation accounted for non-technical loss.

Existing T&D loss in DESA system is 32% with respect to energy received at 132 kV According to calculations technical losses of DESA including 132 kV transmission loss should be between 15%-18%. Overall distribution losses in REB is reported as 16% with respect to energy received at 33kV. According to a recent calculation technical losses for REB system varied between 4.2% to 14% at 20 different sub-stations.

Reduction of technical losses depends on large investment for upgradation and reinforcement of transmission and distribution network and retrofiting of plants with more efficient auxiliary devices. Reduction of non-technical losses depend on good management through administrative measures with some investment on supportive hardware such as meters and test instruments. Poor management, weak administration, indisciplined employees, corruption both at utility and consumer levels, lack of firm political support were responsible for high non-technical losses in the power sector.

Recently, BPDB and DESA have laid down procedures for better management in commercial operation. In DESA this could not be implemented due to resistance from employees. In BPDB also this has not yet been fully implemented. Nevertheless losses could be brought down from 41% in 1991 to 36.9% in 1993. Continuance of high losses is totally undesirable for sustainable operation of the utilities. All out efforts should be made to eradicate nontechnical system loss. The procedures introduced by BPDB and DESA should be fully implemented to reduce non-technical loss.

6. Final Energy Consumption

The total final energy consumption in 1990 was estimated as 683 PJ (Table 4.1). The share of different type of energy sources in final energy mix were as follows: natural gas 12.2%, oil 10.1%, coal 1.8%, electricity 2.8% and biomass fuels 73.1%. Various end uses of final energy were as follows: domestic 64.8%, industrial 19.5%, commercial 1.3%, transport 4.0%, agriculture 1.7% and non-energy (fertilizer) 8.7%.

The consumption of high proportion of final energy in domestic sector and heavy dependence on biomass fuels are indicators of subsistence nature of the economy. In order to enhance economic growth, energy demand in productive sectors are to be increased and the demand is to be met by commercial fuels.

7. Energy Conservation

In Bangladesh efficiency of energy use is quite low. There are good potential to reduce energy demand through conservation measures (introduction of efficient technologies and better management practices) in all the end-use sectors: domestic, industrial, commercial, transport and agriculture. Some attempts have been made to implement energy conservation projects in industrial sector and domestic sector; but it could not achieve notable success.

8. Rural Energy Needs

More than 80 percent of total population of the country lives in rural areas. At present major portion of total energy needs is met by locally produced biomass fuels which is mostly consumed in the household sector for cooking. Ongoing rural electrification programme meets a small portion of total rural energy needs. For overall national development there is a need to pay special attention so that the energy needs of rural areas for subsistence and productive requirements (e.g. agriculture, industries, transport) are met on a sustainable basis. An area based planning methodology will have to be considered to meet the energy needs of different locations.

==========

Source National Energy Policy 1995