

## DEVELOPMENT AND GOVERNANCE OF THE ENERGY SECTOR

### 1. INTRODUCTION

The underprivileged and economically disadvantaged citizens of Bangladesh continue to use non-commercial energy, trapping themselves in poverty and environmental hazards because of several interrelated reasons. Due to lack of electricity, for instance, most people (almost 88 per cent) in the rural areas, particularly poor households are denied a host of modern services, e.g., lighting, access to information through television and other media, and refrigeration. Non availability of modern energy (indigenous natural gas) to about 96 per cent people is also a major constraint in improving the capacity of small-scale producers to generate a higher level of income.

Indeed Bangladesh's economic development has been held back by *energy shortages* for much of the past decade. The scale of shortage has increased as demand continues to dominate supply. Indeed, many other deficiencies and imbalances include, among others, lack of coordination between gas and electricity development, *institutional* and *management weaknesses*, large *gas* between the urban and rural electrification etc.

Overview of the country's energy sector also indicate that it has the lowest per capita consumption of commercial energy in South Asia as well as a large *unmet demand*. Less than 20 per cent of the population have access to electricity and only about 4 per cent households are supplied with natural gas. Only around 2 per cent household use kerosene for illumination in the rural houses for a very short period in the evening.

Although the government has been endeavoring to develop its indigenous gas and electricity systems in the past decades to meet the country's demand for energy, the achievement so far has not been as desired. Consequently the people are increasingly becoming disillusioned with the government actions and performance of the organizations assigned with the responsibility of providing primary energy (Petrobangla and Bangladesh Petroleum corporation) and secondary energy i.e. (BPDB, DESA and REB). In the electricity sub-sector for, instance, the lost output is as high as one per cent (1%) of the GDP (Ref: The Policy Statement of GOB, 2000). This is critical because the foregone economic growth could have taken Bangladesh beyond the threshold level of about 6 per cent of GDP growth that could make a significant and sustained dent on poverty. Indeed, an improved electrical system could also have played an important role for attracting more domestic and foreign investment in manufacturing industry and services because it significantly influence social and human development. Worse still is that the *theft* and *pilferage* (the so-called *system loss* in the power and gas sub-sectors at 30 per cent and 25 per cent respectively aggravated the commercial energy system and incurs huge financial losses.

Development of access to electricity, which is the most popular item in the rural area, aptly sums up its overall benefits. It is in this context GOB's Policy Statement on Power Sector emphasizes on providing access to *affordable* and *reliable* electricity to the majority people by 2020. And that is only possible when gas infrastructure expands rapidly in the western zone of the country. The Sectoral Plan For Natural Gas Sector (April 2001), among others, stresses on *substituting* imported oil by indigenous natural gas through rigorous exploration and development involving both public and private investments.

But the cumulative failure of public institutions in the energy sector has gone a long way towards eroding *public confidence* in the management process. An *excess of bureaucracy*, coupled with a general failure among many political elements to grasp the realities and principles of the *energy sector management* has assumed a serious and critical dimension.

Nonetheless, energy use in Bangladesh has been undergoing *transition* from traditional (bio-mass) fuels to commercial energy (natural gas/petroleum products) fuels in the past two decades, more systematically. Unfortunately, although the traditional fuels, provide almost two-third of the total energy need of the country, there exists no *institutional or policy support* by the Government to *assess* and *harness* these resources optimally. At the same time, it is visible that the present *policy planning, institutional strengthening and infrastructure development* is also severely constrained in the commercial energy sub-sectors, mainly because of the Ministry of Energy and Mineral Resources (MEMR) undue influence on agencies. The MEMR still continues to act as *policymaker, owner, supervisor* and *regulator* on gas and also electricity development etc. However, unadjusted energy prices, inefficient operations of various energy agencies unplanned and unsystematic use of bio-mass fuel etc., also contributes to the improper governance both at the macro-level and at the organization/corporate level. Consequently, adequate reforms are necessary, particularly in the distribution component of the power sub-sector.

However, for encouraging the *private investment* in energy development, the government has already embarked on new initiatives. A *Petroleum Policy* was adopted in 1993, a *Power System Master Plan (PSMP)* was formulated in 1995. This was followed by a comprehensive *National Energy Policy* in 1995. In 1996, *Private Sector Power Generation Policy* and later in 1998, *Small Power Generation Policy* was formulated. Drafting of Bangladesh Electricity Reform Act (1999) but the document had fallen into a bureaucratic trap. Finally, the Energy Regulatory bill was approved by the Parliament in early 2003.

Unhappily, no serious effort has been made to highlight the *energy security issues* of the poor people to support sustainable development. It is widely acclaimed *energy security of the poor* is in fact energy security of Bangladesh. The overwhelming reliance on energy import costs about US\$ 600 million annually. If indigenous gas was not available (annual consumption is 10.10 million tons of oil equivalent), the import of energy to keep pace with the growth envisaged, would have cost the country about US\$ 2.6 billion annually. Therefore, it was no surprise that the 1990s faced the pressure of increasing demand for gas infrastructure, which should be *expanded* expeditiously to help save the country from an *energy poverty*.

The Task Force Report, August 2001, took the above factor, into consideration and suggested, among others, six actions on a priority basis (within 100 days) and nine actions later during the tenure of the government. The proposed actions and the outcome is annexed (1 to 3).

## **2. PRESENT STATUS**

Energy, irrespective of the type, is the basic input for all development activities. A strong *correlation* exists between per capita energy consumption and the economic

development of a country. In Bangladesh, per capita energy consumption (240 kg of oil equivalent in 2002) is far below the necessary development threshold value. On the other hand, access to electricity coverage in Bangladesh, which is one of the lowest in the world, stands at less than 20 per cent <sup>1</sup> of the total population. Consumption of power is also low, only around 120 kWh per capita per annum. Shortage of electricity supply, at times very acute and unreliable, has constrained economic growth. Only about 4 percent of households are privileged customers of natural gas, which is also facing short supply. Consequently, there is a large unmet demand of energy in the country. The lost output is, according to some estimates, as high as one percent of the GDP. The power system Master Plan (PSMP), 1995 with a projected demand of electricity at 9900 megawatt (MW) by 2015 has already been overtaken by events. The present demand forecast is 15,000 MW by 2020 as per the Power Sector Policy Statement, 2000. As almost 90 percent of electricity generation is dependent on indigenous natural gas, the pressure on gas will increase. Petrobangla has conducted a 50-year demand-supply forecast, which overshadows all estimates of gas reserves: 62.9 Trillion cubic feet (or Tcf) by 2050. Based on the present estimate of remaining recoverable reserve of gas (10.6 Tcf in early 2003), the country is faced with the pressure of export of 3.65 Tcf gas (almost 34 per cent of total reserve) to India in the next 20 year (assuming 500 million cubic feet per day). Even by 2020, the demand for gas is estimated at 13.70 Tcf, which will fall short by 3.10 Tcf. International oil companies (IOCs) desire to market gas outside Bangladesh, based on speculative and hypothetical reserve figure will surely create *energy insecurity* for Bangladeshi people. This has brought in a new dilemma for the citizens of this country.

The country's energy sector until recently was a *monopoly* of the public sector enterprises. Gas and (imported) oil sector development activities are conducted through Petrobangla and Bangladesh Petroleum Corporation (BPC) respectively. The country's power sector is configured in one large integrated generation, transmission and distribution system under the Bangladesh Power Development Board (BPDB); large a rapidly growing distribution network under the Dhaka Electric Supply Authority (DESA); and electrification cooperatives known as Palli Biddut Samiteis (PBSs) under the Rural Electrification Board (REB). Each of these institutions performed *poorly* through the late 1980s and the whole of 1990s. Both BPDB and DESA are inefficient, incapable of generating their own reinvestible surpluses and remain loss making entities. During the past decade the power sector suffered from a shortage of funds, inadequate policy options by the management, low employee commitment, high system loss and rampant corruption by the management and the workers trade unions etc. This leads to huge financial losses in the power sector (approximately US\$ 100 million annually) The cumulative loss in one decade alone was around US\$ 1 billion. (Ref: Energy strategy Note, the World Bank, 1998). Demand for gas has been growing rapidly in the last two decades. To establish a higher reserve, the need for extensive risk investment is undeniable. Petrobangla generally shows an operating profit, which is pumped out by the government every year without ploughing back for exploration and development thereby the organization suffers. Payment to the national exchequer during 2000-01 was Taka 1470 crore, including CD/VAT and compulsory dividend (Ref: Annual Report, Petrobangla 2002). BPC, until recently, was a profit making organization, has recently turned into a loss making enterprise, mainly due to mismanagement, financial indiscipline and high government tax etc.

### 3. SECTOR STRUCTURE

The energy sector in Bangladesh is primarily controlled by the Ministry of Energy and Mineral Resources (MEMR). The main operating entities include Petrobangla, BPC, BPDB, DESA/DESCO as public sector entities, while Independent Power Producers (IPPs) and International Oil companies (IOCs) are private sector operations. The following activities are generally assigned to the enterprises under the energy sector:

**Box 1: Structural Situation**

Agency	Activities	Comments
<b>MEMR</b> (Ministry of Energy and Mineral Resources)	Owner, controller, overall regulator and supervisor of all organizations such as Petrobangla, BPC, BPPB, DESA/DESCO, REB/PBCs	The MEMR is assisted by two superfluous projects/cells namely, the Hydrocarbon unit (HCU) and power Cell that creates unnecessary tensions
<b>BPDB</b> (Bangladesh Power Development Board)	<ul style="list-style-type: none"> <li>Integrated generation, transmission (now distribution (32% of the total distribution in the country) since 1972.</li> <li>Also the also buyer of electricity from the IPPs and RPC (expected to be 1280 MW in mid 2003 or about 34% of the total generation in the country.</li> <li>The transmission component was unbundled from BPDB to the Power Grid Company (PGCB) created under the company's law in late 1996.</li> </ul>	<ul style="list-style-type: none"> <li>Unbundling started in 1977/78 with the creation of REB for expediting rural electrification</li> <li>Major distribution being concentrated in the greater Dhaka area, was unbundled in 1991 and the activities were transferred to DESA.</li> <li>All 230/132KV transmission lines are being transferred to PGCB</li> <li>Areas (contiguous) to REB are being transferred from BPDB/DESA, even urban/semi urban areas</li> </ul>
<b>DESA</b> (Dhaka Electric Supply Authority)	<ul style="list-style-type: none"> <li>created in 1991 as a public sector authority</li> <li>Until recently almost 52% of total distribution in the country was handled by DESA, now reduced to 40%</li> </ul>	<ul style="list-style-type: none"> <li>Some areas have been transferred to REB</li> <li>DESCO (Dhaka Electric Supply Company) has been created under the Company's law. So far Mirpur, Gulshan/Banani/Baridhara has been annexed to DESCO.</li> </ul>
<b>REB</b> (Rural Electrification Board)	<ul style="list-style-type: none"> <li>Created in 1977/78</li> <li>Area coverage has expanded (for distribution of electricity in the rural areas) from 12% to around 24%</li> </ul>	<ul style="list-style-type: none"> <li>67 Rural cooperatives operate under REB as Palli-Biddut Samities (PBSs)</li> <li>Only three PBS areas under REB have their own small (10-12MW) generating units</li> </ul>
<b>PETROBANGLA</b>	<ul style="list-style-type: none"> <li>Created in 1974</li> <li>Nine (9) Operating companies from exploration to productions and marketing operate under the company's law. These OCs are Bapex (Bangladesh Exploration and Production Company); TCTDC, JGTDC, BGFCL, RRGCL, GTCL etc.</li> </ul>	<ul style="list-style-type: none"> <li>Petrobangla has not been corporatized</li> <li>It acts as a regulator for IOCs operation</li> <li>IOCs produce about 17% of the total natural gas</li> <li>Petrobangla with its OCs produce 83% of the gas consumed in the country.</li> <li>Saves about 10.10 Million tons of oil equivalent (Mtoe) or about US\$ 2 billion annually</li> </ul>
<b>BPC</b> (Bangladesh Petrobangla Corporation)	<ul style="list-style-type: none"> <li>Created in 1977 as a Holding Corporation to hold the shares of its subsidiaries (three oil marketing Companies, one refinery, one LPG Company, two lubricant manufacturing company.</li> <li>Only authorized organization to import oil and POL products (about 3.5 million tons/annually). Incurs about US\$ 600 million annually for the said import.</li> </ul>	<ul style="list-style-type: none"> <li>Until recently BPC was a profit making corporation. Recent years it has become a huge loss making organization mainly due to heavy taxes/duties imposed by Government.</li> </ul>
<b>RENEWABLE ENERGY SECTOR</b> (Non-Commercial Energy Sources)	<ul style="list-style-type: none"> <li>Almost 65% of the total energy use (39.14 Mtoe) met through non-commercial renewable resources such as biomes, wood fuel etc. However, actual statistics on renewable energy sources are not available.</li> </ul>	<ul style="list-style-type: none"> <li>Government involvement for development and exploitation of biomass energy or any other renewable energy must be ensured (either as REDA or any other form)</li> <li>Private sector effort is slow to develop solar, wind energy sources, but that's very insignificant compared to the demand</li> <li>Alternative sources of electricity such as solar and wind power may be explored/exploited to be supplied to isolated rural areas/remote villages. Design of such alternative sources should be simple and affordable</li> </ul>

<sup>1</sup> As per Policy statement of the Government in January 2000. Unofficial indication from the Ministry of Energy is that the coverage has increased to 30 per cent.

Ideally, through an effective distribution system (under PBSs) for electric power, its generation, can be located at the centre of the load, thereby eliminating the need for long transmission lines which reduces the cost of investment in transmission equipment. The need for low cost distributed power systems to improve the quality of life in the rural area is urgent, in part, to assure balanced economic development as well as to help stem the tide of migration from the village, into the emerging and increasingly unmanageable towns and cities.

While inputs of energy are regarded as means to the end of providing a wide range of *energy services* like cooking, lighting, transportation and communication etc. Understanding the human needs which energy serves is critical. Traditional fuels (fuel wood and crowding etc) remain the primary source of energy in the rural areas (where more than 80 percent of the total population live) which are referred to as *poor women's fuel*. A more privileged but minority group has access to oil, gas and electricity, while the urban and rural poor are mostly deprived of such commercial sources of energy.

The following items and action taken/being taken and problem faced are shown in the following matrix as ready reference:

**Box 2: Matrix of Actions taken and need to be removed**

Item No.	Action Taken/Being Taken /Not Taken	Problems likely to be faced/Need to be removed
1. (Unbundling-corporatization of Power stations/plants.	<ul style="list-style-type: none"> <li>Modest measures have been initiated to unbundle the power sector as a pre-condition for a competitive market</li> <li>Major generation units (Ghorasal Haripur,Raozan etc) except Ashuganj are yet to be corporatized. A half-way arrangement such as converting a power station (Haripur) into Strategic Business Unit (SBU) is an innovative idea.</li> </ul>	<ul style="list-style-type: none"> <li>Workers Union in BPDB obstructs the unbundling/corporatization effort.</li> <li>SBU cannot be a substitute of corporatization because, among others, it does not fully comply with the transparency and accountability aspects in addition to legal requirements</li> <li>The Government/BPDB has not yet decided the optimal number of generation companies that should be corporatized.</li> </ul>
2. (Reform/Regulation)	<ul style="list-style-type: none"> <li>Ashuganj power station is being corporatized. Haripur 90 MW plant has been named SBU.</li> <li>For institutions to function effectively, Energy Regulatory Commission (ERC) Bill has been approved by the Parliament in March/April, 2003.</li> </ul>	<ul style="list-style-type: none"> <li>The government should clearly identify the difference between corporatization and privatization</li> <li>Rules/Regulations and other details should be worked out soon for operationalization of the unit otherwise interference by the MEMR will continue. The Regulator must have a degree of independence (which is contradicted in the approved bill). A distinct legal mandate, free from MEMR's control, be provided to the ERC. The regulation as framed, do not clearly strike a proper balance between 'independence' and 'accountability'.</li> </ul>
3.(Generation Addition)	<ul style="list-style-type: none"> <li>No Perceptible Measure Has Been Taken In The Past Two Years (2001-03) To Initiate Construction Of New Power Plants Under The Public Sector/IPP</li> <li>Discussion Is On For Installing Tongi 80 MW And Three 450 MW Plants At Meghnaghat, Sirajganj and Bheramara under joint venture.</li> </ul>	<ul style="list-style-type: none"> <li>From 2004 onwards power shortage will reappear unless measures are taken now</li> <li>In the next 5 years all new power plants should be located in the western zone</li> <li>No positive action can be witnessed in that direction</li> </ul>
4. (Transmission NLDC)	<ul style="list-style-type: none"> <li>In the western zone a new long distance 230 kV transmission line is expected under PGCB</li> <li>No positive action seem to have been taken to construct a modern Load Dispatch Centre (NLDC) in Dhaka (Badda area)</li> </ul>	<ul style="list-style-type: none"> <li>The proposed 230 kV transmission lines (Ashuganj to Sirajganj and Khulna to Dinajpur) when constructed will act as a backbone grid-line</li> <li>Until NLDC is constructed economic dispatch from both public and private sector (IPP) power plants can not be ensured</li> </ul>
5. (PSMP)	<ul style="list-style-type: none"> <li>The Power System Master Plan (PSMP), 1995 implementation phases have not been updated (according to Task Force recommendation, August 2001)</li> </ul>	<ul style="list-style-type: none"> <li>PSMP updating should be undertaken soon. The implementability of Power Policy Statement, 2000 should be examined</li> </ul>

Item No.	Action Taken/Being Taken /Not Taken	Problems likely to be faced/Need to be removed
6. (IPP etc)	<ul style="list-style-type: none"> <li>Coordination between the state sector generation and IPP generation appears lacking</li> </ul>	<ul style="list-style-type: none"> <li>Up to 2005 the ratio between the State sector and IPP should not cross 75 : 25 ratio</li> </ul>
7. (Relay coordination)	<ul style="list-style-type: none"> <li>The Relay coordination between generation and transmission lines appear lacking</li> </ul>	<ul style="list-style-type: none"> <li>Relay coordination must improve otherwise brownouts/blackouts will continue.</li> </ul>
8. (Retirement Plan)	<ul style="list-style-type: none"> <li>There should be a clear retirement plan for old/inefficient public sector plants</li> </ul>	<ul style="list-style-type: none"> <li>The proposed work is important</li> </ul>
9. (Reserve Margin)	<ul style="list-style-type: none"> <li>Absence of Reserve Margin makes the power/gas systems more vulnerable</li> </ul>	<ul style="list-style-type: none"> <li>By 2006/07 a 15% Reserve Margin in the power generation/gas production would be necessary</li> </ul>
10. (Petrobangla Coporatisation)	<ul style="list-style-type: none"> <li>Except the mother organization (Petrobangla), all nine operating entities have been corporatized under the Company Law. But he OCs (subsidiaries not in legal terms) face serious road blocks in operation and management</li> </ul>	<ul style="list-style-type: none"> <li>Petrobangla may be corporatized, if adequate justifications can be found. However, the relationship between the OCs and Petrobangla must be clarified soonest.</li> </ul>
11. (Bapex)	<ul style="list-style-type: none"> <li>For undertaking systematic and optimum exploration for oil and gas, Bapex was created in April 1989. Subsequently, government took a decision (in the ECNEC) to authorize Bapex to conduct 4 (four) exploration drilling every year, but it was not effected upon.</li> <li>The decision of the government (April 5, 1994) to set aside 4% as Bapex margin (or exploration fund) be implemented</li> <li>Block-11 and other blocks relinquished by the IOCs as per PSC should be allotted to Bapex</li> </ul>	<ul style="list-style-type: none"> <li>From July 2001, Bapex started production of gas. So, it should henceforth be considered an exploration and production company</li> <li>Government should write off the expenditures incurred during 1961-89 (by OGDC/Petrobangla etc) and all other losses up to 2001</li> <li>By 2005-06, Bapex is likely to produce 90 million cubic feet per day (MMcfd) which should be enhanced through development of other Petrobangla fields</li> <li>SD/VAT should be reduced from 55% to 25% in case of Bapex</li> <li>Government should allocate adequate funds to conduct exploration and drilling under Bapex.</li> <li>A field by field gas depletion policy be introduced on proper investigation by Bapex.</li> </ul>
12. (BPC)	<ul style="list-style-type: none"> <li>Bangladesh Petroleum Corporation's activities are not streamlined for turning the corporation or profit making body</li> </ul>	<ul style="list-style-type: none"> <li>Marketing companies operating under BPC should continue to operate as subsidiaries (public sector). These companies should not be privatized.</li> </ul>

### 3.1 Enterprise Restructuring and Corporatisation

Until recently, like other developing countries, Bangladesh had integrated energy utilities which benefited the nation from economies of scale and scopes<sup>2</sup>. All the donor agencies supported this view and accordingly continued to assist financially. Their attitude started changing since late 1980s. The efficiency of the integrated monopoly structure (state owned) has been increasingly questioned over the 1990s. For instance, with the advent of the combined-cycle gas turbine using natural gas, with an efficiency of 50 per cent and over together with significantly reduced capital costs, enabled the private power generator to enter generation business (through Private Power Generation Policy formulated in October, 1996). In the natural gas development, except for the transmission component, generally considered as natural monopoly of the state sector, demand for restructuring came up seriously. Like most developing countries, Bangladesh adopted a single buyer model and is now buying power from the IPP/IPC (by BPDB) for onward sale to distribution entities. Gradually, PGCB will be responsible for wheeling when it takes over all the high tension (230/132 KV transmission lines) in the country. PGCB is entrusted with: optimal dispatch of generation, planning the transmission system, acting as a single buyer, operating and maintaining transmission system etc. Unfortunately, as yet, distribution has remained non competitive. The idea is not to create competition with each other, rather their performance should be comparable. It is expected that a change will soon occur due to restructuring, as described below:

<sup>2</sup> World Bank's Energy Strategy Note, 1998.

### Box 3: Implications of Sector Restructuring

<b>Institutional</b>	<ul style="list-style-type: none"> <li>Unbundling integrated monopolies in to generation and distribution companies (transmission company-PGCB has already been formed). Corporatization of entities unbundled. Petrobangla/BPDB/DESA to be corporatised.</li> </ul>
<b>Financial</b>	<ul style="list-style-type: none"> <li>Unbundling of accounts, apportionment of assets, debt, and working capital</li> </ul>
<b>Personal</b>	<ul style="list-style-type: none"> <li>Reassignment of Staff to the various entities</li> <li>Transfer of acquired rights/assets</li> </ul>
<b>Network Operations</b>	<ul style="list-style-type: none"> <li>Elaboration of network codes, standards, and dispatch rules</li> </ul>
<b>Pricing</b>	<ul style="list-style-type: none"> <li>Elaboration of financial and tariff policies</li> </ul>
<b>Commercial</b>	<ul style="list-style-type: none"> <li>Elaboration of contracts between producers, transmitters and distributors</li> </ul>
<b>System development</b>	<ul style="list-style-type: none"> <li>Articulation of rules for systems development including planning of new capacity, approval of expansion plans, regulatory process etc.</li> </ul>

A key theme should be that commercial energy markets (although only one third of the total market), with proper design, can offer a broad range of sustainable and profitable energy services to low-income households. It is generally assumed that the poor would be better off if they could consume more and better quality energy sources at affordable prices. In addition, there is a general expectation that, all things equal, they would choose to do so if given the chance, despite limited resource. The issue is can they afford? The problem is likely to increase as urbanization intensifies. Bangladesh wide, around eighty million citizens, who live in the rural areas, lack access to modern energy (electricity, gas and petroleum products). Low-income households use a diverse mix of fuels to meet their needs. While higher-income households tend toward commercial, high-value fuels such as electricity, gas, petroleum products and LPG for both domestic and productive user, the poor tend to use more human and animal motive power for productive purposes and more bio-fuels (wood, dung, straw residues for cooking and candles, kerosene (around 5%) for lighting (domestic purposes). As incomes grow, households generally switch to electricity for lighting and fossil fuels for cooking while in agriculture and industry, electricity and diesel engines replace human and animal motive power. One World Bank Study concluded that in urban areas the *transition* to modern fuels is generally complete by the time per capita income reach around US\$1000 (Ref: ESMAP, Energy and Development Report, 2000. The World Bank). Even in 2002, the per capita income of Bangladesh has not crossed US\$ 380 mark.

Still for poor households, commercial energy is becoming more important part of the mix for both consumption and productive purposes. Several factors work behind this emerging pattern, which include, the quality of energy from bio-fuels is low, and applications are limited. People who want to use good lights, radio, or appliances need commercial energy (including such sources as photovoltaic panels and batteries). Also, in heavily deforested areas (in the western zone across the river Jamuna) and urban and semi urban areas bio-fuels have become so scarce that they too have become commercialized. Once consumers pay cash for traditional fuels (or use so much time gathering and preparing them), they are more likely to consider other commercial energy options. The most interesting part is that modern fuels have become cheaper in real terms. Despite a recent uptake in price, oil is cheaper, in real terms, than they were before the first oil shock in 1973. Cost of generation under the IPP operation shows low tariff (US 2.73 cents/kWh for 360 MW Haripur and US 2.79 cents/kWh for 450 MW Meghnaghat plant) compared to over US 3 cents/kWh in the public sector plants (under BPDB). Due to increased efficiency more units of electricity are generated per unit of

fuel. The capital costs of combined cycle technologies have also fallen. Therefore, policies and markets need to be designed to elicit information on access and demand.

#### 4. DEMAND SCENARIO

##### 4.1 Principles of Energy Demand Projection

Generally, demand projection is based on certain assumptions on the variables related to the projection. Short-term demand projection for a foreseeable future depends on known variables. Long-term demand projection deals with a lot of hypothetical assumptions on the variables. The present industry practice of making long term demand forecast is to limit the forecast for a period not exceeding thirty (30) years in the western world. National Energy Policy, 1995 has also forecasted energy demand for twenty five (25) years, from 1996-2020. But, looking at the energy security perspective 50 years demand forecast may not seem unreasonable for Bangladesh (India is currently following a 50 years projection). 50 years gas demand forecast (assuming a 70% dedication in the commercial energy use in Bangladesh) is however, linked with (a) energy pricing, (b) role of renewable (particularly solar) and non-renewable energy supply under global energy (scenario) trade etc. The national level issues are: (a) expected electricity growth and its implication to GDP growth, (b) demand of urea fertilizer, and (c) gas reserves (the proven reserve being only 6.2 Tcf and proven plus probable ranging between 12 to 15.5 Tcf as per committee reports). Meanwhile, the government has expressed its desired goals and objectives to become a mid-income country by 2020. It has also declared its Policy Statements (both electricity and gas). The policy concerning natural gas (indigenous) highlights its availability as a cheap and secure fuel for electricity generation.

##### 4.2 General Observations

Although non-commercial energy predominates the energy sector demand (almost 65% of the total), the natural gas accounts for almost 70% of the commercial energy. Almost 90% of electricity generation in the country depends on natural gas. Total consumption of gas increased from 332 billion cubic feet per year (2.63 Mcf/person/year, total population 126 million in 2000. The consumption has increased to 390 Bcf in 2002 (3.1 Mcf/ per person/year, population increased to 130 million). Estimated consumption of different type of imported petroleum products in 2002 was about 3.5 million tons (25.8 kg/person/year). The National Energy Policy, 1995 (for commercial energy) in its Reference forecast showed:

**Table 1: Commercial Energy Demand Forecast**

	2000	2005	2010	2015	2020
Population (million)	126	141	153	165	177
GDP Growth (%)	6.4	7.2	7.3	8.2	8.7
Per capita GDP (\$)	254	318	416	560	774
Energy Growth Rate (%)	8.7	9.8	8.3	8.8	9.4
Per capita kgoe	94	131	194	269	384
Total Energy (Mtoe)	12	19	31	46	72

Note: In 2002 the country consumed 13.60 Mtoe Commercial Energy (Source: MIS Report, Petrobangla)

According to the World Bank's new definition, per capita consumption of commercial energy including biomass (renewable), in 1996/97, was 197 kgoe in Bangladesh and per capita GDP was US\$ 350. The per capita consumption has increased to 240 kgoe in 2001 and per capita GDP went up to US\$ 380 in the same year.

##### 4.3 Petrobangla Estimate

Petrobangla made an attempt to conduct study based on disaggregate methodology, which is a simpler approach and offers an outcome that shows:

**Table 2: Gas Demand Projection (2001-50) (In Tcf)**

	2001-2010	2011-20	2021-30	2031-40	2041-50	Total
Power	2.51	5.26	8.26	11.03	12.46	39.79
Fertilizer	0.97	1.12	0.88	0.88	0.88	4.75
Industrial	0.82	1.68	1.86	3.78	4.36	13.52
Dom/Comm/Others	0.53	0.79	1.05	1.21	1.33	4.93
Total (Tcf)	4.84	8.86	13.05	16.91	19.31	62.99

The demand forecast made by Petrobangla (in April 2001) was based on information/data collected mainly from the bulk consumers, such as BPDB, BCIC and other end-use consumers such as Industries, Domestic and Commercial sectors. The results so obtained (by Petrobangla) indicate that gas demand will rise from the level of 346 Bcf annually (or 948 MMcf/day) in 2000 to 1.31 Tcf annually of 3589 MMcf/day) by 2020 against a gas reserve (proven plus probable) of about 11 Tcf (which is expected to sustain production up to 2020). Thereafter, Bangladesh will have to solely rely on oil (or gas) *import*, if no new reserves/discoveries are added to the present reserve estimate. According to Petrobangla, the sum of all sector (2001-2050) shows that 62.9 Tcf gas would be needed. This gives an annual growth rate of slightly over 3.5%. The Nagorik Committee endorses the sectoral demand model used by Petrobangla.

#### 4.4 National Gas Reserve Committee Estimate

“Energy demand projection for a developing country such as Bangladesh is an extremely difficult thing to perform. This is because economic growth, which is the main driver for energy growth, is difficult to predict” (Ref: Report of the Committee for Gas Demand Projections and Determination of Recoverable Reserve and Gas Resource Potentials June, 2002 submitted to the Government on 27 August, 2002, page/9). The Committee observed that the task of projecting energy demand becomes that much more difficult when the horizon is long. The Committee mentioned about two methodologies for demand projection. The first projection based on the energy intensity (EI) of the economy (top down approach) and the second, projection derived from desegregated energy analysis (bottom-up approach). The Committee stated that although a desegregated or sectoral type projection validated by a macroeconomic model is the most desirable (such as Petrobangla’s 50 year Gas Demand projection in April, 2001), the exercise being laborious and time consuming was discarded. However, based on the Committee’s ‘EI’ ‘model’ the demand scenario stood as:

**Table 3: Demand Scenario (2010-2050)**

Higher intensity/year	Upto 2010	2020	2030	2040	2050
Annual growth 4.5%	4.7	13.5	27.7	46.6	69.0
6%	5.1	16.1	36.3	66.9	110.0
7%	5.4	18.1	43.8	86.6	152.0
Lower intensity/year					
Annual growth 4.5%	4.7	12.6	24.7	41.8	64.0
6%	5.0	14.9	32.2	60.0	101.0
7%	5.3	16.8	38.8	77.7	141.0
PETROBANGLA	4.8	13.7	26.8	43.7	63.9
GUC at 5%	Gas growth rate	11.1			
6%		11.6			
7%		12.0			

Source: National Gas Committee, 2002

The National Gas Reserve Committee actually conducted a domestic demand for gas for 2010-2050-taking each 10-year period cumulatively. The parameters they used are

alternative economic growth rates (3%, 4.55%, 6% and 7%) and energy intensity. The Committee reportedly tried various methodologies for projection namely linear, exponential and mix of exponential and linear-and found that the linear-exponential mix with EI adjusted to a declining rate yields a better projection of sustainable demand (apparently there is a judgment involved). Based on that the above table summarized the projections of the. National Reserve Committee, Petrobangla and Gas Utilization Committee (GUC). The above table however excluded projection on the basis of 3% economic growth, too pessimistic and uninteresting; 4.5% has been written in place of 4.55%. The difference among the projections is relatively narrow in the initial years (say 2010); as one move out in time, the difference gets wider and significant.

On the Committee projection, demand for gas will be 13.5 to 18.1 Tcf in 2020, assuming that the economy grows at 4.5% to 7%. Petrobangla estimates demand at 13.7 Tcf in 2020. According to the Reserve Committee the gas reserve (12.04-15.5 Tcf) is just about enough or falls short of demand for the period to 2020. Petrobangla projection of 13.7 Tcf falls short by 3.10 Tcf (their remaining recoverable reserve is 10.6 Tcf in 2002). GUC apprehends that *gas starvation* may start as early as 2014 if demand grows at 7% annually, which may be deferred to 2016 or 2017 if demand growth at 5% or 6% respectively.

The Gas Utilisation Committee (GUC) has also examined the issue in similar light. For instance, it undertook a demand exercise up to 2020 and their finding that under short and mid-term demand-supply projections there is a problem of short supply which clearly discourages export of gas from the current reserves (even assuming a reserve of 16.1 Tcf.

#### 4.5 Demand for Power

With the acceleration in the demand for power, the Power System Master Plan (PSMP, 1995) forecast appear to have been overtaken by events. The demand and gross energy generation (GWh or Million kWh) forecast (under the Reference Scenario) indicates that from a maximum demand of 3150 MW in 2000a the recorded rate of electric energy has been increasing at an average rate of about 8.5 percent in the post decade. In 2000-01, electricity use in the industries sector was 42% of the market, while the household consumption was 43%; agriculture and commercial sectors showed 6% and 9% use respectively.

The maximum demand and gross energy generation forecast under PSMP remained short by 9 percent, consequently, resulting in higher load shedding during the summer of 2002. In fact IPP generation did offset the forecast in 2000/2001.

**Table 4: PSMP Forecast (Reference forecast)**

Year	Max. Demand	Gross Energy Generation (GWH)
2000	3149	16,500
2005	4597	24,000
2010	6779	35,000
2015	9906	52,000

\* Power Policy Statement, 2000 indicated a forecast of 15,000 MW (72,000 GWH) by 2020.

## 5. ENERGY SECURITY

Essentially, there are three basic questions that we need to address to appreciate the energy security issues obtaining in Bangladesh.

First, what is energy security?

Second, what kind of energy security we need to consider for Bangladesh?

Third, how long Bangladesh will survive with a single energy source (Natural Gas)?

To understand and appreciate the first question, let's briefly look into the performance of the energy sector in Bangladesh. Over the past one decade, the sector has been afflicted by *shortages* of gas and electricity, stifling economic growth, and social welfare. The country is faced with formidable challenges in the sector harnessing its energy resources for sustained mid to long term socio-economic development and more immediate challenges of overcoming gas and power shortages. A significant loss of industrial output can be directly attributed to energy shortages. Reliable estimates are not available, but various manufacturers association indicate that production could be about 10 percent higher if power was reliable. These shortages make a section of producers/manufacturers insecure. So, there is a need to pay attention to ensure energy security of different categories of customers and the citizens at large. Energy is thus a strategic input necessary for socio-economic development. The basic principle of energy security is to ensure the supply of appropriate source of energy to meet the demand of different end-use sector. In a particular situation of the supply of energy is less (physical shortage) than the demand an insecure situation arises. *Energy insecurity* may also occur due to lack of purchasing power. Indeed, an imbalance between demand and supply of energy (energy insecurity) may occur at individual, household, community, district/division or even country level. This insecurity may take place at a particular time of the day, during certain period of the year, for some years. Energy insecurity is a multidimensional problem. The following dimensions of energy security is discussed:

**Box 4: Dimensions of Energy Security**

Spatial dimension	Socio-economic dimension	Temporal dimension	Environmental dimension
<p><b>Countrywide</b></p> <ul style="list-style-type: none"> <li>Various factor contribute to energy insecurity, such as : <ul style="list-style-type: none"> <li>Weak institutional capabilities at planning level and implementation level;</li> <li>Lack of financial technological management capabilities</li> <li>Political insensitivity to rational energy pricing policy</li> <li>Lack of good governance</li> </ul> </li> </ul> <p><b>West zone</b></p> <ul style="list-style-type: none"> <li>Compared to the East zone, in the past 30 years indigenous primary energy resource (gas/hydro or coal) was not available for which economic development was much lower. Of the total generation of electricity only about 30% firm capacity is available in western zone</li> </ul> <p><b>Rural Areas</b></p> <ul style="list-style-type: none"> <li>Almost 80% people live in rural areas. There is an insignificant percentage of area covered by gas, 10% by electricity and 5% by Kerosene supply.</li> <li>Unplanned use of bio-fuels cause environmental degradation</li> <li>Provision of fossil fuels distribution programme</li> </ul>	<ul style="list-style-type: none"> <li>Critical observation of Rural Electrification programme through user cooperative called PBS is generally considered a success story because it has made positive contribution to economic development</li> <li>But R/E could not as yet provide energy security for sustainable human development to the majority of the population who live in the rural areas.</li> <li>Almost 85% households in the rural area are unserved with R/E</li> <li>Indeed, the poorer section of the rural population suffers from energy security</li> <li>Lower income households use inferior type energy source for cooking, that remains</li> </ul>	<ul style="list-style-type: none"> <li>Timeliness is a critical factor for energy security. Temporal dimension of energy security is to be considered simultaneously under long-term, medium term, yearly, seasonal, and daily perspectives, Failure to supply required quantity of energy under any of the above mentioned time variable might contribute to energy insecurity.</li> <li>Lack of/short infrastructure in the western zone led to energy supply insecurity</li> <li>There is a need to pay serious</li> </ul>	<ul style="list-style-type: none"> <li>Environment factors in the energy sector do not receive adequate attention, although in the recent years representative of the Ministry of Environment do get proper places in the process of approval of energy sector projects.</li> <li>Per capita emission of carbon dioxide gas in Bangladesh in 1990 and 1996 were reported as 0.1 and 0.2 tons per person per year, which is low in comparison to world average</li> </ul>

<p>make the life of rural people energy insecure</p> <p><b>Chittagong Hill-Tract</b></p> <ul style="list-style-type: none"> <li>• Kaptai hydro-power generation in the CHT area since the 1960s caused human insecurity of the people of that area and non-availability of electricity in the affected area makes the energy security vulnerable. About 40% agricultural land of the area were inundated during construction of the project.</li> </ul>	<p>uncertain because of collection difficulties. Being a poor women's fuel, sometimes womenfolk may have to walk a long distance to collect fuels at the cost of much hard labour.</p>	<p>attention to meet long-term energy security of the country to ensure sustainable development.</p>	<p>emission of 3.3 and 4 tons per person per year (WB 2001)</p>
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The second question is what kind of energy security we need to consider in Bangladesh? In short it is related to demand and supply security of various energy sources, be it bio-fuel or gas or imported oil or even hydroelectricity. To be more specific, energy is needed for economic and social development and in essence aimed at poverty alleviation. Other than natural gas and hydro-electricity no other commercial energy source has yet been exploited (in a commercial scale). Hopefully, by 2004 commercial mine production of coal would take place and a major portion of it will be consumed for generation of electricity (about one million ton/year coal production for about 60 years from a deposit of about 300 million tons in Barapukuria. In the western zone, across the river Jamuna, gas transmission reached, but network extension is being unnecessarily delayed since early 1999 when a 30 inch diameter high pressure gas pipeline reached Sirajgonj). One of the main feature of low level of development of fossil fuel is weak public sector institutions both upstream and downstream. The government knows about the energy insecurity in the western zone of the country, but hardly there is any effort to resolve the relevant issues. In sum, the present energy insecurity clearly speaks of low energy development in the country.

The third question is how long Bangladesh will survive with a single commercial energy source? This is a million dollar question. Petrobangla's estimate indicate that by 2020 the present reserve will exhaust. National Gas Utilisation Committee (2002) even with its magic number 16.1 Tcf reserve showed that gas reserve would exhaust by 2014-15, when *import* of either oil or gas would be necessary to continue operation of the existing major power and fertilizer plants (which usually has 25 to 30 years effective life). Effort should there fore be made to exploit more coal or coal bed methane (CBM). In order to ensure energy security for sustainable development it is reasonable to estimate long-term energy need of the country for a period of 50 years in the future.

## 6. PRESENT CONCERNS

Energy policies have a key role in the development and growth strategies of the government. Ready access to reliable, reasonably priced energy-particularly by industry, agriculture, and the commercial sector is an important catalyst for growth. For rural households, better energy services can boost welfare example, by reducing time, for spent collecting bio-mass fuels for cooking or by boosting the productivity and income of household business. More recently, the government have focused attention on the institutional framework that support investment and service delivery. But, because of lack of goodwill in the government's approach the authorities could not move appropriately to reform the (existing) framework. Consequently, neither operational efficiency have been enhanced nor mobilising adequate finance for system expansion in both gas and power sector have been possible.

An underlying objective of energy sector projects is to give low-income households and communities in rural and semi-urban areas better access to modern fuels to allow them to shift from bio-mass fuels to kerosene or gas for cooking, to put electric lighting in a school or power a refrigerator in a community health clinic or to access electricity for lighting etc. Interventions of these kinds are expected to have important and direct effects on the welfare of the poor. Potential effects of improved energy is shown below:

**Box 5: Potential Effects of Improved Energy Services in Alleviating Poverty**

Direct effects on well-being	Direct effects on health	Direct effects on education	Direct effects on economic opportunities for the poor	Trickle-down effect of increased productivity
<ul style="list-style-type: none"> <li>Improved access to lighting etc</li> <li>Saving in time and effort to gather bio-mass and other fuels</li> <li>Improved access to information (through radio, TV, and telecommunications)</li> </ul>	<ul style="list-style-type: none"> <li>Improved indoor air quality</li> <li>Reduced fire hazard</li> <li>Improved quality of health service (through better lighting, equipment and refrigeration)</li> <li>Easier establishment of health centres</li> <li>Better education</li> </ul>	<ul style="list-style-type: none"> <li>Improved access to lighting, allowing more time to study</li> <li>Savings in time and effort, releasing time and energy to channel to education</li> </ul>	<ul style="list-style-type: none"> <li>Easier establishment and greater productivity of business that employ poor</li> <li>Creation of employment in infrastructure service delivery</li> <li>Increasing individual productivity</li> </ul>	<ul style="list-style-type: none"> <li>Easier establishment and greater productivity of business in general (including through positive impact on the environment)</li> </ul>

Unfortunately, Bangladesh's economic development has been constrained by energy shortages for much of the past decade. The scale of shortages has increased as demand continues to run ahead of supply. Many other deficiencies and imbalances include, among others, lack of coordination between gas and electricity development, institutional and management weaknesses, a large gap between the urban and rural energy supply. Two most important concerns include that it has the lowest per capita consumption of commercial energy in South Asia as well as a large unmet demand. In the power sector, for instance, the lost output is as high as one percent of GDP (Ref: The Policy Statement of the Government, January 2000). This is critical because the consequential foregone economic growth has impacted the threshold level of 6 to 7 percent of GDP growth. Moreover, poor power system is acting as a deterrent to domestic and foreign investment in manufacturing industry and services. GOB's Policy Statement (2000) on power sector emphasises access to affordable and reliable electricity to the majority of the people by 2020 as a key development goal. This target is perhaps too ambitious, but the activities of the past two years do indicate that the government is not serious about its own vision and plan.

Another major concern is the cumulative failure of public institutions in the energy sector. This has led towards eroding public confidence in the administrative process. An excess of bureaucracy, coupled with a general failure among many political elements to grasp the realities and principles of energy sector management continues to constrain sector development. The present policy planning, institutional straightening and infrastructure development initiatives in case of commercial energy development remain severely constrained, mainly due to:

- the Ministry of Energy's multiple role as policymaker, owner, supervisor, operator and regulator;
- lack of a clear policy guideline to conduct a systematic exploration and exploitation of energy resources, particularly natural gas;
- inefficient operations of various energy enterprises;

- unadjusted energy prices, particularly natural gas for generation of electricity;
- unplanned and unsystematic use of bio-mass fuel;
- lower priority given to meet the total energy need of the rural areas;
- improper governance both at the macro level and at the organisation corporate level;
- inadequate to no attention given to implementation of reform package;
- least attention given to the energy security of the poor;
- undue indulgence to the pressure groups including the worker's union in both power and gas sector;
- tolerating the inefficiencies and corruption in the energy sector;
- serious lack of attention to improve the financial performance of the utilities;
- under supply of gas and electricity ; and
- the pressure of demand on infrastructure for power, gas and relative services and the government's inability to finance a commercial expansion of supply capacity.

There are many reasons for the energy sector's disappointing performance over the past decade. To start with, the institutional set-ups are manned by inferior quality personnel. Consequently, management and decision making is poor. A powerful vested interest led by the workers union gain from the sector's difficulties. Moreover, the government has consistently chosen to subordinate necessary priority actions to short term political considerations. BPDB and DESA, which together accounts for about 75 percent of the electricity sales, have remained inefficient (with over 30% system loss). Investments in the sector has remained inadequate. Annual public investment in the gas and power sector is barely 20% of the actual need. The energy sector's project implementation process is very unsatisfactory, with lengthy delays being the norm. The electricity industry suffers from structural problems, which have become self perpetuating due to the absence of a holistic reform strategy. These issues deserves strategy changes that the government should offer new directions for redefining the government, role; increasing institutional capacity building; establishing autonomy, accountability and transparency in the energy institutions; and setting up the Energy Regulatory commission (ERC).

## **7. ENERGY PRICING**

### **7.1 Scope and objective of Pricing Policy**

Energy pricing is an important tool for demand management, especially in the long-run. But, in practice, in Bangladesh, it has so far been carried out on an ad-hoc basis. Typically, electricity and gas sub sector pricing have traditionally been done independently of each other. Practically, the pricing and investment decisions should be closely related. However, the energy supply systems e.g., electricity energy generation, transmission and distribution; gas wells and pipeline usually require large capital investment with long lead times and lifetimes. Therefore, once the investment decision is made, usually on the basis of the conventional least-cost method of meeting demand by sub sector, with regard for inter-fuel substitution possibilities, there is a lock-in effect with respect to supply. Thus, prices ideally should be related to the long-run planning horizon.

The objectives of energy pricing are closely related to the goals of energy planning, but they are more specific. First, the economic growth objective requires that pricing policy

should promote economically efficient allocation of resources, both within the energy sector and between it and the rest of the economy. Second, the social objective recognises every citizen's basic right to be supplied with certain minimum energy needs. Given the existence of significant numbers of poor consumers (in fact, majority are poor in Bangladesh) and also wide disparities of income, this implies subsidised prices, at least for low-income consumers (in real life rural people pay more for electricity under the rural electrification scheme). Third, the government would be concerned with financial objectives relating to the viability and autonomy of the energy sector. Fourth, energy conservation is also an objective of pricing policy. Fifth, there is also a need for price stability, to prevent shocks to consumers from large price fluctuations, and the need for simplicity in energy pricing structures to avoid confusing the public and to simplify metering and billing. Finally, there are other specific objectives, such as promoting regional development (e.g.; rural electrification) of specific sectors (e.g; export oriented industries) and other socio-political, legal and environmental constraints. Keeping in view the above the gas and electricity pricing issues in Bangladesh have been discussed.

## 7.2 Gas Pricing

National Gas Pricing Policy Formulation Committee established in 1997 recommended, among others, that tariff structure for all the commercial energy sources including electricity should be fixed (if possible in one go) in a coordinated manner.

It may be noted that price setting mechanism in place reflect that: GOB fixes the gas price, no predetermined method is followed, *ad hoc* mechanism to make up budget deficit and generate fund to make payment to the production sharing contractors.

Current price is lower than the cost of supply and LRMC. But this was objected to by the World Bank who strongly recommended a methodology to be followed based on LRMC. It should also be noted that bulk consumers (power for instance) are highly subsidised.

On the other hand PSC gas price is linked with the international fuel price. Basis of price: 75% of Basket of HSFO at FOB Singapore. Prices are close ended with floor price: US\$ 70/ton and ceiling price US\$ 120-140/ton. (ceiling price fixed at US\$ 120/ton under new PSCs). Price is calculated on 30 days average and three month's average. Payment to be made within 45 days of invoice. Late payment carries interest at LIBOR plus 1%.

Another interesting part of the pricing under PSC gas price is that: The IOCs are not liable to pay SD/VAT, Corporate tax under PSC waived for the contractors, to be paid by Petrobangla on their behalf. Payment to be made in US\$ for cost recoverable and profit gas.

Basically, there are three different pricing and fiscal regimes in Bangladesh with respect to gas namely: the regime followed before Petrobangla; assessing the fiscal and balance payments impact of IOC gas, similar in principle to the post-IOC regime. It appears that determination of price was driven by consideration of government revenues and later (after IOC gas entered the domestic market) consideration to compensate Petrobangla's loss or IOC's income. Some of the critical principles might have been ignored in the process such as marginal cost or full cost recovery, resource rent, rationing through price.

According to GUC, Petrobangla has significant advantage over IOC's in cost of production. Petrobangla produces one Mcf gas at Tk. 8 (eight) only at Rashidpur. IOC

produces the same quantity at Tk. 35 (thirty five) at Jalalabad (a field Unocal acquired almost free of cost) and Tk. 56 (fifty six) at Sangu (off-shore). IOCs cost is enormously higher (perhaps because of gold plating of their cost). The main difference is in personnel compensation, Petrobangla's compensation being much lower. Depletion premium is a critical component of non-renewable resource price, including that of gas. The exhaustible resources are included in the asset account of an economy, subject to clear ownership and control. The reserve itself does not enter the national income accounts; only the benefits accrue to the economy when production starts. There is a crucial difference between producible economic assets and non-producible assets: in the latter case one unit used today means that it will not be available in the future. Depletion premium is the value of the non-renewable asset consumed today which reduces availability tomorrow: it is opportunity cost of non-renewable asset in an inter-temporal or inter-generation context.

### **7.3 Power Price**

Currently, of the fossil fuel, gas is used for producing 90% of electricity; the remaining are diesel (3%) and furnace oil (7%) based. Electricity produced in east zone are all gas based. Generation of electricity at minimum cost in future will depend upon availability of gas. In the east zone, fuel cost for production of one kWh is very high. In the west zone, fuel cost for production of one kWh low. Gas has already reached in west zone, but gas use for generation of electricity is delayed. The cost data are inadequate and there are several price distortions. No attempt to compute the future value or to discount back from some future date has been made; such refinement would produce meaningful and precise number with correction for price distortions etc. The critical point to note is that the cost of gas based electricity production is one fourth or one fifth of oil based production (BPDB Annual Report: 1999-2000, PP. 21,24; data relate to 1999-2000).

Another way to have a sense is to look at the following illustrative calculations. In 1999-2000, BPDB supplied one kWh of electricity at a cost of Tk. 2.31 only. The average fuel cost was Tk. 0.61 in east zone (gas based production) and Tk. 3 in west zone (mix of oil fired gas and steam turbines).

Electricity from IPP had come on stream in 1998-99. Non-fuel cost is about Tk. 1.7 per kWh. If non-fuel cost would remain unchanged, cost of supply of one kWh of electricity would be Tk. 5.7 i.e; 2.5 times higher. A small proportion of the population has access to electricity now; it would be affordable for a much smaller proportion at the higher price (BPDB Annual Report: 1999-2000, PP. 22,24).

The above data bring in to sharp focus the regional dimension of energy policy and use of gas resource. Supply of electricity to the west zone cannot be expanded unless more electricity is produced at minimum cost using gas.

In FY 1998, BPDB's average retail tariff for its ultimate consumers was Tk. 2.61/kWh (US \$ 0.055/kWh), and PBSs Tk. 3.30/kWh (US\$ 0.07/kWh), leading to a weighted average tariff of Tk. 2.76/kWh (US\$ 0.058/kWh), as compared with the estimated Long-Run Marginal Cost (LRMC) for supply of power of Tk. 3.86/kWh (US\$ 0.078/kWh). Although LRMC is not followed, yet it would be interesting to note that the LRMC will, hopefully, decline by end 2003 due to lower cost of production from Haripur (360 MW) and Meghnaghat (450MW). The tariff offered by the IPPs in the late 1990s were

US\$0.0273/Kwh and US\$0.0279/kWh would become fully effective when Meghnaghat come into operation by June, 2003. However, the tariff levels of the BPDB were always low in relation to its costs as well as financial requirements of its operating units. BPDB's average tariff was only 61 percent of its subsidies to the PBSs though a bulk supply tariff is 52 percent of the LRMC. Such attempts at cross subsidisation by BPDB had adversely affected the financial viability of the utilities.

## 8. CONCLUDING REMARKS

Unhappily, conventional energy strategies fail to meet basic human needs of the poor majorities in Bangladesh. One analysis indicates that energy becomes an instrument for eradication of poverty only when it is directed deliberately and specifically towards the needs of the poor. Such need based approach is not compatible with the widely – held energy trickle-down strategy, wherein the sole pre-occupation is with the *supply* of energy, under the assumption that once energy is pumped into society it will automatically trickle down to the end-uses relevant to the satisfaction of basic needs. Just as the economic trickle down theory has been shown to be ineffective in addressing poverty, so is energy trickle down an ineffective means of coping with the energy needs of the poor.

If the focus of energy planning is merely on the supply of energy, without scrutinizing the structure of demand, then whether energy ever reaches the poor to perform the services they need will be largely a matter of chance. Conventional supply oriented energy strategies are unlikely to make a dent in the poverty of the majorities in developing countries. In fact, such policies may even accentuate inequalities. This is because, in a situation of inequality, the pattern of demand is skewed, with the energy supply than the needs of the poor. And when energy supply is shaped by such skewed demand patterns, it reinforces privileges and aggravates poverty, leading on an even worse skewing of the pattern of demand.

What is required is to shift energy planner's and policymakers preoccupation with energy supply to the mundane but vital end uses of energy such as *cooking*, which rank high in the priorities of people, and to the energy sources such as fuel-wood which are used for these high-priority purposes. Only if energy is deployed as an essential component o a programme to satisfy the basic needs of the population, with special emphasis on the needs of poverty-stricken sectors, it is likely that there will be an improvement in the conditions of the poor as a consequence of actions relating to energy planning.

It is evident from the above discussion that the energy sector in Bangladesh has been afflicted by shortages of gas and electricity. The pressure on increasing *demand for infrastructure* in power and gas and also related services and the *government's inability or lack of interest* to finance energy projects has created a crisis situation. The *concessional loans* such as ODA is less readily available now because the development partners (particularly the World Bank) are promoting vigorously the private investment theory. Consequently, the International Oil Companies (IOCs) and the Independent Power Producers (IPPs) are showing great interest in investment mainly because they are *less risky* in Bangladesh. For instance, exploration to discovery ratio has been established at 3:1 and the policy of generation of electricity is in the private sector *extremely liberal* and offers almost no *risks* to the foreign investors.

However, the problems in the energy supply (in the public sector) is more acute now than 10 years before mainly due to *inefficiency* and *corruption* in all aspects of operations. Inadequate funding for maintenance of facilities, insufficient investment in new facilities, low levels of *commercialisation* and *financial discipline*, *low tariffs*, *excessive government intervention*, insufficient expertise and serious lack of attention to improve the financial performance of utilities are common features in the current energy sector. Therefore, the *reform* in the gas and power sector, expanding access to modern energy sources in the rural areas is critical to raising productive potential of rural (poor) people. *Access to electricity*, for instance, reduces the cost of energy services.

Serious efforts are needed to improve the reliability and quality of electricity where it is now available i.e., to substantially reduce *load-shedding* and *low voltage* that are common. In order to do that the policy planning may prioritise the areas where national grid power should be taken in future with the resources the government willing to commit for the period 2003-2007. The availability of coal and gas (hydropower extension be prohibited on energy security consideration) technology and finances will determine what types of electrical plants will need to be built and where? This will also necessarily explain the details about *IPP generation*, *captive power* and small *power generating* units (10-15 MW each) for PBS/REB etc. For the remaining part of the country which cannot be initially brought under grid-access, other opportunities for distributed generation (dg) including solar and wind power may be explored. It must however be noted that the *energy efficiency* concerns even when the county consumes very small amount of electricity. The *unbundling* of generation and distribution (transmission under the Power Grid Company be consolidated and expanded) and corporatisation of entities will not fully solve the problem of electricity and gas unless the issue of *theft* and *pilferage* and *non-payment* of energy consumed is stopped forthwith. Sometimes policy makers get carried away with enthusiasm (mainly) because of bureaucratic tangle and political vested interest) about the IPPs and IOCs because the foreign companies show interest in investing in these two low risk (or no risk) sectors. Serious impact study should be undertaken at the earliest before further investments are allowed. Sincere effort must also be made to *limit* the IPP and IOC participation for a sustainable development of the energy sector.

It has been observed over the years that political government in Bangladesh has by and large not been a strong institution and their indulgence to workers `unions' in the energy sector has made it weaker. The experience in the sector has thrown up certain important truths, chief among which is the fact that there has been absence of *incentive* for good performance. A lack of *accountability* and over dependence on *bureaucratic control* has made a bad situation worse. Where the simple rule in modern times is for utilities to be run in the manner of commercial enterprises, with *revenue* being the main consideration, consequent of course on a healthy provision of services, precisely the opposite has been in practice.

The reform of the sector, necessitated as much by experience as by prevailing global trends, call for a new and more serious attention. The perception envisages a democratic political context which conditions the process of *governance* and should earn a respect in Bangladesh society. Effort is necessary for the political party in power to initiate dialogue with the opposition parties to arrive at credible solutions sought which will

pursue parties to reach out to a new constituency considered in the short and long term. Finally, there is a dire need for *deferring gas export* issue until comprehensive *reserve estimates* are accomplished for all gas field in Bangladesh and are *certified* by internationally accepted independent professional companies. This would provide the government a *bankable gas reserve document*, such as the one obtained by Unocal (an IOC operating in Bangladesh) for Bibiyana gas field in greater Sylhet area.

## 9. THE WAY FORWARD

Bangladesh has once again been afflicted by *shortage* of natural gas and electricity. This should not be. Although the country does *not* have ample proven reserve of gas, it can be optimally used in *domestic markets* for ensuring higher economic growth, social welfare and overall *energy security* of the country.

The western zone, across the river Jamuna, is *energy hungry*. Natural gas, (30 inch diameter pipeline) has reached there in 1999, but its network expansion has been over delayed, particularly during 2000-03. This should be expedited.

The cost of combined cycle power plants, which can be installed fairly quickly, has declined. The cost of gas turbines in particular has *drastically reduced* during the post decade (100 MW plant now cost even on a turn-key basis at around US\$ 30 million as against US\$ 100 million ten years back). Government should allocate fund.

Due to non-availability of funds from the government (as approved by ECNEC in the 1990s) and delays in decision making regarding new gas exploration effort by Bapex has been over delayed. Delays in drilling much needed production wells have aggravated the gas supply situation. There is no reserve margin, the demand and supply of gas have reached a peak. Any maintenance work etc. (the recent *Beani bazaar* supply problem) for a sustained period will mean shut-down of power plant or fertilizer unit. This must be avoided forthwith.

Worse still is that *corruption* and *inefficiency* in all aspects of operation (production and distribution in particular), billing and collection explains the unnecessary problems in energy in Bangladesh. *Financial rehabilitation* of the sector is a must, if the sector is to recover. Bangladesh could change this. Under a *sector reform* these could be addressed. Energy shortages would reduce within a few years as systemic issues of inefficiency, corruption, and mismanagement begin to be addressed. A 30 per cent system loss in electricity and 25 per cent loss in gas is simply non acceptable. The situation must improve.

Sector reform have already started in a modest way. To increase these momentum, the recently approved regulatory commission bill would be helpful, but a *cautious* and *judicious* application of the some seems necessary. Apparently, there are some conflicting provisions amended adequately to avoid future conflicts, clearly, reform in the only sustainable option, otherwise shortages will continue.

Addressing all these issues in the energy sector will require *time* and *investible* fund. Areas deserving priority attention in the sector includes: *alleviating* power and gas shortages through : (i) installing around 1000 megawatt new generating units in phases, preferably all to be located in the western zone of the country; (ii) drilling four to five

production wells, and (iii) at least two exploration wells annually by Bapex for the next five years.

Measures have been initiated to *unbundled* the power sector – a precondition for competition and commercialisation. But the restructuring effort has been repeatedly delayed. The government should not suffer from ownership crisis of the reform package approved in 1994. the worst component i.e., the distribution aspects much be corporatised as subsidiary companies of BPDB. The BPDB should be turned into a *holding company* under the existing company law. Unless the distribution components of BPDB and DESA are unbundled and corporatised soonest huge system loss will ultimately eat up the sector because the stakes are high and the stakeholders (workers' union) are politically motivated. Petrobangla, the mother organisation, should be corporatised. This is an inevitable mother organisation, should be corporatised. This is an inevitable short term measure, that must be implemented. No short-cut or diversion should be encouraged in the process of corporatisation (such as strategic-business unit etc.). The regulatory institution should be truly independent, not indirectly regulated by the Ministry of Energy and Mineral Resources. In essence, the ERC should protect the interest of the consumers not the private sector.

Extending rural electrification should be a mission, not a routine development programme. Only around 12 per cent (at the most) of the rural Bangladeshi have access to electricity. Achieving the high economic and social benefits from rural electrification deserves contributing support. The PBS model is well accepted. But the REB is gradually becoming complacent on their achievements even when the system loss ranges between 16 to 18 per cent in distribution alone. This attitude must change. The financial viability of rural power schemes can be insured by increasing the connection density of existing networks, rather than insisting on the transfer of rural electricity networks of BPDB and DESA to REB/PBS. Priority should be given to schemes that are least cost and promise high penetration rates at an early stage of the electrification programme.

Solar home system (although many times more expensive) could be promoted in non-grid areas especially where the willingness to pay has been established. Instead of relying entirely on private sector participation, the public sector should provide institutional support and funds to encourage rural generation and distribution in a liberal-regulated environment.

## Task Force suggested six (6) Actions:

	<b>100 days Action points suggested in the Policy Brief</b>	<b>Actions Taken/Proposed by the Government</b>
<b>First</b>	Reaching a consensus on the <i>reform package</i> approved by the government (in 1994). Adoption of the proposal for an <i>independent regulatory commission</i> .	No visible effort made to reach a consensus on reform package.  Bill on independent energy regulatory commission has been approved by the Parliament
<b>Second</b>	Taking expeditious action to conduct a <i>comprehensive Gas Reserve Estimate</i> of all 22 discovered gas fields through internationally known independent certifying/appraiser company as per <i>gas field practice</i> , and update the reserve estimate annually by Petrobangla/Bapex.	Instead of following international gas field practice, two National Committees were formed on 26 December 2001 to update the Gas Reserve Estimate and also conduct an exercise on Gas Utilisation Options. However, no instruction was issued to Petrobangla/Bapex to conduct routine appraisal/updating of gas reserve.
<b>Third</b>	Alocating adequate funds to Bapex for conducting gas exploration/drilling	Reportedly the subject of allocation of adequate funds to Bapex was discussed at the Ministerial level but the issue has not been resolved
<b>Fourth</b>	Instructing Petrobangla/Bapex production CO's to professionally carry out (as a routine) <i>gas reserve management</i> and <i>depletion exercises</i> (field by field)	To out knowledge no instruction was given.
<b>Fifth</b>	Keeping in view the PSMP, 1995 and the Power Policy Statement, 2000, BPDB should be encouraged to identify priorities for <i>installing more power plants</i> in the <i>western zone</i> , preferably in the ratio of 80:20 during the coming 5-year period upto 2006	Neither BPD nor IPP was encouraged to come-up with new <i>Doable plans</i> for installing new power plants.
<b>Sixth</b>	Initiating discussion on optimum utilization of gas. Gas Export issue should be made contingent on the proposed comprehensive reserve estimate as per international practice.	National committee reports were submitted to the government but no formal/official response was made publicly

	<b>Actions Suggested in the TFR (August, 2001)</b>	<b>Actions Taken/Proposed by the Government</b>
1.	<ul style="list-style-type: none"> <li>Improve reliability and quality of electricity (where available now) i.e. reduce load-shedding and low-voltage.</li> <li>Review, among others, the National Plan and Priorities where Grid-power can be delivered through commitment of government funds (during 2001-06).</li> <li>When coverage area is determined a time-table has to be developed to achieve the proposed coverage based on the existing network. Review the Power System Master Plan (PSMP, 1995), Policy Statement, 2000 and establish the need for additional generation capacity to meet the known load, at least for the short-run.</li> <li>The availability of coal, gas and hydro, technology and finance will determine what types of plants will need to be built (base load/peak load, combined-cycle/simple cycle etc).</li> <li>Inventory of IPP, captive or small power generating units (for PBS) be made for future expansion plans.</li> </ul>	<ul style="list-style-type: none"> <li>No visible effort noted to help improve reliability, quality of existing electricity network.</li> <li>Reportedly National Plan and priorities have recently been discussed but no outcome is known.</li> <li>A draft Implementation Plan of GOB's Vision Statement/ Policy Statement on power sector reform has been drafted (2001-2020) in recent months including indicative time-table in phases (2002-07, 2001-12, 2012-1017, 2017-2020) but no formal document has been published by the GOB.</li> <li>No record available about review of PSMP, 1995.</li> <li>No such comprehensive records are available. In the absence of 5-year Plan document the sector appear to have become direction less.</li> </ul>
2.	For the remaining part of the country which cannot be <i>initially</i> brought under <i>grid access</i> , other opportunities for distributed generation (dg) including solar and wind need to be explored.	The issues do not seem to have attracted the attention of GOB.
3.	The <i>energy efficiency</i> concerns need to be discussed in view of the continued shortages on the supply side and new measures be considered so that the same end-use service can be met with less consumption of electricity.	<ul style="list-style-type: none"> <li>No record available regarding initiation of energy efficiency activities with regard to the gas or power sector.</li> <li>Energy Monitoring Unit (EMU) established in 1984-recently merged with the office of the Chief Electrical Inspector.</li> </ul>
4.	<ul style="list-style-type: none"> <li><i>Unbundling of generation and distribution</i> and corporatisation of entities will not fully solve the problems of electricity and gas unless the issue of <i>theft, pilferage</i> and <i>non-payment</i> for energy consumed continues.</li> <li>For instance, through unbundling of the BPDB, REB was created in 1977/78, DESA was created in 1991, but the <i>theft culture</i> now got expanded to new unbundled organisations as well.</li> <li>In the gas sector, all eight/nine operating companies (production, transmission and distribution) have been corporatized under the Companies Act, 1994 but the <i>mother organization</i> i.e. Petrobangla has not yet been corporatized (as Holding Company like the BPC) under the Companies Act which is acting as an obstacle to overall development</li> </ul>	<ul style="list-style-type: none"> <li>The process of unbundling power generation as per recommendation of the Reform Committee, 1994, is not followed as desired Rather, implementation of a new concept has been introduced, such as Strategic Business Unit (SBU). But concept has no legal back up, nor it is transparent and accountable as corporatization</li> <li>Pilferage/theft is merrily continuing.</li> <li>Petrobangla has not yet been corporatized/converted into a holding corporation.</li> <li>OC's are now almost in a chaos because adequate freedom is not given as per company Act, 1994.</li> </ul>
5.	Cost and benefits being derived from IPPs and IOCs needs to be calculated. The general impression is that these two politically and economically <i>low risk</i> activities must be evaluated for future guidance. An impact study should also be undertaken.	Sketchy exercise has been made by GUC. Detailed economic implication of the PSC need to be worked out.
6.	<i>Gas Exploration, Marketing, Consumption and Export</i> have been exposed to a longstanding debate. The government can not decide what it wants to do. The issue of export in particular has been complicated by unresolved controversies on the reserves. According to Petrobangla, the recoverable reserve of around 11.9 Tcf will be used up by 2019 under the forecasted level of usage. This is an alarming signal. The reserve position should be (credibly) certified through independent and internationally reputed professional companies/ institutions.	The <i>debate</i> on Gas Export is still continuing. The Government do not seem to have either adopted or discarded the findings of National Gas Reserve Committee/Gas utilization Committee. In addition to the National Committees appointed by the Government, Bangladesh Geological Society and Bangladesh Economic Associations jointly carried out a review of the committee reports under the banner of Nagorik Committee Report which was submitted in early 2003 to the Government. No formal response was received from GOB.
7.	Viability and adaptability of other energy options, such as <i>Solar, wind power</i> etc. should be examined.	Development of non-commercial (renewable) energy options remained outside the domain of the government.
8.	The value of distributed generation (dg) and energy audit/ <i>efficiency improvement</i> measures be examined	The issue of dg and energy efficiency only appear in seminar/conferences. GOB do not consider them seriously.
9.	Initiate in-house discussions on sub-regional <i>energy cooperation</i> within the frame work of Ganges-Brahmaputra-Meghna (GBM).	Government may explore the prospects of regional cooperation.

**Note:** TFR suggested a concerted effort by both public and private sectors would be necessary to implement the recommendations made in the Report. Building Greater awareness within civil society could also contribute significantly towards creating pressure for expectation, acceptance, implementation and adoption of doable policy measures.

## BANGLADESH MEDIUM-TERM POLICY MATRIX

Strategic Goals/ Policy Objectives	Actions Already Taken	Medium Term Agenda	
		July2003 - June2004	July2004 – June2006
<i>Privatization and Deregulation</i>			
<b>Reform SOEs to reduce losses and strengthen their efficiency and competitiveness</b>	<ul style="list-style-type: none"> <li>Performance orientation in SOE activities has been reinforced.</li> <li>Budgetary transfer to SOEs has been controlled and NCBs are not providing new loans to defaulting SOEs.</li> <li>SOEs activities are being closely monitored</li> <li>New Privatization Policy has been adopted.</li> <li>Adamjee Jute Mill and 16 (sixteen) mills have been closed</li> <li>One SOE has been privatized and another 8 (eight) in the process</li> <li>TCB, part of BADC, BSFIC, BSC are being closed down.</li> <li>100 SOEs have been decided to be privatized including 53 SOEs have been earmarked for privatization in 2003.</li> <li>Long overdue increase in the prices of petroleum, gas and power implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Rationalization of administered prices would be continued.</li> <li>SOEs identified for privatization would be sold or closed down.</li> <li>Additional SOEs would be identified for privatization</li> <li>An economic pricing framework for utilities would be developed.</li> </ul>	<ul style="list-style-type: none"> <li>SOE losses would be significantly reduced and private sector will be further promoted.</li> <li>Budgetary transfer to the SOEs will be brought down significantly.</li> </ul>
<b>Rationalization of Power Sector</b>	<ul style="list-style-type: none"> <li>Ashugonj Power Station has already been corporatized.</li> <li>Haripur Gas Turbine Power Station has been converted into SBU.</li> <li>The transfers of transmission lines, according to the action plan, are being gradually handed over to PGCB.</li> <li>BPDB and DESA each prepared a list of the largest 1000 numbers of defaulting consumers and the disconnection process is going on.</li> <li>Tariff has been increased by 5% with effect from August 1, 2002 for all categories of consumers.</li> <li>The proposal of West Zone Power Distribution Company has been approved by the Finance Committee of the Cabinet on July 7, 2002. West Zone Power Distribution System Company Ltd. is likely to be incorporated as a Company under the Company Act, 1994 soon.</li> <li>The whole process of handing over will be completed by December, 2002.</li> <li>The draft “Bangladesh Electricity Reform Act 2002” was prepared and approved by the Cabinet on 11 February, 2002.</li> <li>The field offices of DESA and BPDB are taking actions against the delinquent consumers as a continuous process in collecting revenues. For increasing revenue earnings, many consumers have been allowed payment of arrears by installments. Both the agencies are trying to resolve the problem of high accounts receivables through a policy of persuasion and legal measures.</li> </ul>	<ul style="list-style-type: none"> <li>Government has decided to combine the drafts “Bangladesh Electricity Reform Act, 2002” and “Gas Act” together. The combined Draft Act renamed as “The Energy Regulatory Commission Act, 2002” has been prepared by the Ministry of Law, Justice and Parliamentary Affairs, which is under examination in the Power Division as well as Energy and Mineral Resources Division and will be placed in the Cabinet for approval. After approval by the Cabinet and enactment by the Parliament, an Energy Regulatory Commission will be formed under the said Act.</li> <li>Draft Pricing Policy has been prepared and it is under consideration of the Government.</li> </ul>	<ul style="list-style-type: none"> <li>Continue implementation of power sector rationalization measures to create an efficient energy sector as a critical input to growth.</li> </ul>