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## **QUEST FOR ENERGY SECURITY IN BANGLADESH: CHALLENGES AND PROSPECTS**

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### **Abstract**

Energy security is one of the major policy concerns for Bangladesh. Currently, the country with its vast population is facing formidable challenges in supplying energy in spite of having some mineral resources and significant amount of renewable resources options. To understand the overall energy scenario of the country, existing reserves of renewable and non-renewable energy resources have been discussed in the paper. In the energy security context, several issues such as export of gas, electricity shortage and high dependency on imported oil are real threats to ensuring supply of energy to meet the growing demand. These issues have been discussed within the conceptual framework of energy security for the country's rapid economic growth. To overcome the challenges, sustainable energy development through intra-regional cooperation with SAARC, BIMSTEC and extra-regional collaboration with the OPEC countries has also been touched upon in the paper.

**Key Words:** Security, Energy, Demand, Supply, Renewable, Non-renewable

### **I. Introduction**

Energy is the lifeblood and dynamic engine of growth in the twenty first century.<sup>1</sup> For Bangladesh, it is a crucial factor for its

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future prosperity. At present, the country has huge energy demand against very limited supply which is growing rapidly. Between renewable (biomass, hydroelectricity, wind and solar energy) and non-renewable energy resources (natural gas, coal and oil), the latter has significant role to play in the country's overall economic growth. Due to the unprecedented demand of these resources, the country now has become heavily dependent on available mono-energy resource (e.g. natural gas) and imported fuels. On the other hand, among the renewable energy resources, biomass is the main source of energy in the rural areas but its unsustainable usage is putting its future in jeopardy. Other renewable resources (solar, wind, and hydroelectricity) cannot be utilized efficiently because of its high price, physical constraints, technological backwardness and an ineffective energy policy. Therefore, the country is now facing formidable energy deficiencies due to these various natural and manmade factors.

However, this scenario leads to two key questions. The first is what are the threats that make the energy sector insecure? The second is how to overcome the challenges to ensure its long term sustainability. It is in this backdrop, the paper tries to address the overall energy scenario, the immediate challenges in this sector and possible ways to ensure long term energy security considering the issues of technologies, environment and regional cooperation. To address these issues, Section II of the paper describes the overall energy situation in Bangladesh. In Section III, the conceptual framework of energy security is analyzed. Some key issues, which are threats for this sector, are also identified in this section. In section IV, an attempt is made to observe the existing intra-regional cooperation in which Bangladesh is a member of regional groupings such as SAARC and BIMSTEC and extra- regional cooperation with the Organization of Petroleum Exporting Countries (OPEC) countries. Finally, Section V offers some policy recommendations towards attaining energy security in the country.

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<sup>1</sup> Peter Meier and Mohan Munasinghe, *Sustainable Energy in Developing Countries: Policy Analysis and Case Studies*, Edward Elgar Publishing Limited, Cheltenham, UK & Northampton, USA, p. 19.

## II. Energy Resources of Bangladesh: An Overview

By and large, Bangladesh is not well endowed with substantial amount of non-renewable energy. In case of renewable energy, biomass, solar energy, and hydropower are important and their usage is predicted to continue to grow. Biomass is the dominant source of energy followed by natural gas, imported oil, and hydroelectricity.<sup>2</sup>

### *a. Non-renewable Energy*

Natural Gas: Owing to its large potential gas reserve of 15.4 Trillion Cubic Feet (TCF) in 2005, Bangladesh is becoming increasingly important to world energy market. However, estimation of gas reserve varies significantly from agency to agency.<sup>3</sup> In addition, experts and officials expect that there may be a possibility to find more gas fields in the country.<sup>4</sup> In 2004, production and consumption of gas were 462.626 Billion Cubic Feet (BCF) and 462.626 BCF respectively that showed an even disbursement (see,

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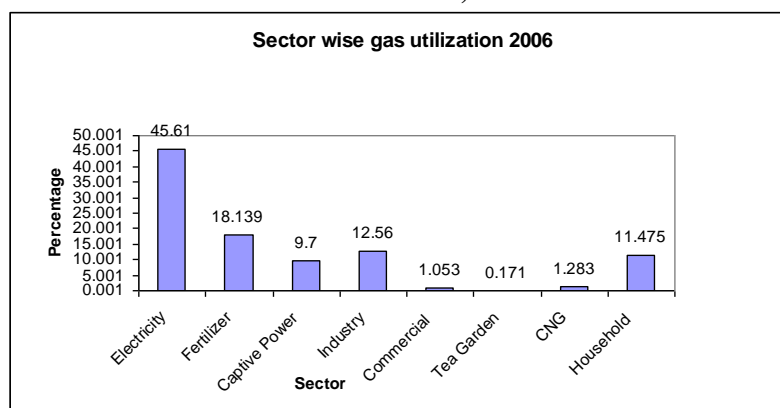
<sup>2</sup> Among the total energy resources, 57.44 per cent is used from traditional fuel or biomass, 24.72 per cent from natural gas, 12.80 per cent from imported oil products, and 0.8 per cent from hydroelectricity. For details, see, ABM Ziaur Rahman, 'Environmental Aspects of Energy Exploration in Bangladesh and the Role of EIA: The Case of the Sunderbans', *BISS Journal*, Vol. 24, No.3, July 2003, pp. 390-426.

<sup>3</sup> In January 2007, Oil and Gas Journal (OGJ) reported that Bangladesh had only 5 TCF of proven natural gas reserves which is less than previous year, 2006 (15.397 TCF) and other previous estimated reserves. In addition to this, in 2004, Ministry of Finance reported that Bangladesh contains 28.4 TCF of total reserve. For details, see; Country Analysis Briefs: Bangladesh, July 2006, Bangladesh Energy Data, Statistics and Analysis-Oil, Gas, Electricity, Coal, available at <http://www.eia.doe.gov/emeu/cabs/Bangladesh/Full.html>, accessed on 4 May 2008.

<sup>4</sup> In the baffling scenario, the country is trying to discover more new gas fields to meet the additional demand of different sectors. In 2006, the country discovered a new gas field with 500 billion cubic feet (BCF) reserves in block 9 at Gazipur, about 40 km north of Dhaka. Overall, four international companies are engaged in the production, development, and operation of 10 out of the country's 23 hydrocarbon blocks. For details, see, 'Bangladesh Natural Resources News', available at <http://www.skyscrapercity.com/archive/index.php/index.php?t-401751.html>, accessed on 30 April 2008.

Annex 1). As of FY 2005-2006, production of gas reached at 526.72 BCF and daily production was around 1.66 BCF.<sup>5</sup> At present, consumption of produced gas has increased and has been extensively used in different sectors in spite of having daily shortage of around 100 Million Cubic Feet (MCF). Currently, natural gas constitutes 80 per cent of commercial energy consumption and nearly half of it is produced to meet the rising demand of electricity generation (see, Chart 1).

**Chart 1: Sector Wise Gas Utilization, 2006**



Source: Data Collected from Petrobangla, 2006.

Apart from the onshore blocks, offshore<sup>6</sup> ones are another potential source of energy in Bangladesh. Currently, out of 23 blocks, there are only 5 offshore and the rest are onshore blocks. However, gas reserves were explored from the two offshore fields - Sangu and Kutubdia.<sup>7</sup> Between these two, the country is able to extract gas only from the Sangu field (see, Annex 2).

<sup>5</sup> Reported in *Jugantor* (a Bengali daily), 19 May 2007.

<sup>6</sup> Offshore energy denotes the resources that a country derives from sea not from the mainland. In context of Bangladesh, off shore energy means particularly oil and gas including its other forms such as petroleum, kerosene etc.

<sup>7</sup>In 2005, the total proven and probable reserves of these two fields were 1,031 BCF and 65 BCF respectively. For details, see, Ministry of Finance, *Bangladesh Economic Review 2005*.

Coal: In the north, Bangladesh has 2 billion tonnes of coal reserves (equivalent to 53 TCF of gas) in five different locations.<sup>8</sup> The status of deposits, however, varies by the government and other sources like that of total gas reserves (see, Annex 3). On 24 June 2006, another 105 million tonnes (MT) of quality coal was discovered in the north that is likely to increase up to 600 MT over an area of 12 square km.<sup>9</sup> In the absence of any commercial production, the consumption of this energy remained about 0.4 MT in 2005 that made the country a net importer. However, in January 2006, the first commercial production of 250 MW of electricity began from Barapukuria.<sup>10</sup> Besides, it is estimated that from the second coal fired power plant near Phulbari, the country would be able to generate 3,700 GW/h electricity burning 1.5 MT of coal annually.<sup>11</sup> These are, however, not sufficient to meet the country's ever rising demand of electricity.

### ***b. Renewable Energy***

Renewable energy resources also termed as 'alternative energy systems' has been proved to be cost effective and economically feasible in many countries.<sup>12</sup> In case of Bangladesh, the country is extremely dependent on traditional fuels such as agricultural residues, firewood, and dung. Other fuels such as solar energy, wind power and hydroelectricity constitute a very small proportion of the total energy consumption (see Annex 4). For this reason, the country has adopted some sustainable energy projects and Renewable Energy Technologies (RET) though these are at the initial stage of progress and implementation.

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<sup>8</sup> Shahiduzzaman Khan, 'Asia Energy-Coal and Power for Bangladesh', available at [http://www.advfn.com/stocks/asia-energy-coal-and-power-forbangladesh\\_10615972.html](http://www.advfn.com/stocks/asia-energy-coal-and-power-forbangladesh_10615972.html), accessed on 2 May 2008.

<sup>9</sup> Serajul Islam Quadir, 'Bangladesh Discovers New Coal Reserve' available at <http://www.planetark.com/avantgo/dailynewsstory.cfm?newsid=36993>, accessed on 01 May 2008.

<sup>10</sup> Bangladesh Country Analysis Briefs 2006, *op.cit.*

<sup>11</sup> *Ibid*

<sup>12</sup> Christopher A. Simon, *Alternative Energy: Political, Economic, and Social Feasibility*, Rowman & Littlefield Publishers, INC, USA, p. 42.

i. Biomass: About 98 per cent of the total biomass energy is supplied by the agricultural residues (68 per cent), animal dung (16 per cent), homesteads (14 per cent), and rest of the 2 per cent obtained from the reserved forest.<sup>13</sup> As of 2005, consumption of biomass was 16.6 MT that accounted for 57 percent of the total energy consumption, while it was 70 percent in 1993.<sup>14</sup> The increase of commercial and private energy consumption (e.g. cooking), and declining number of forests in the country are the main causes for the decline. Different public and private organizations have taken various initiatives to reduce the high dependency on traditional fuels.<sup>15</sup> In addition, government is also providing \$120 subsidy to install family-sized biogas plants estimated average capacity of 2.8 m<sup>3</sup> of daily gas production.<sup>16</sup>

ii. Solar Energy: Overall, the country receives an average daily solar radiation of 4-6.5 kWh/m<sup>2</sup> that covers 0.1 per cent of the total

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<sup>13</sup> M. A. R Sarkar, *et al.*, 'Performance of a Stand-Alone PV Home Lighting System', *Bangladesh Renewable Energy News Letter*, Vol. 1, No. 2, Vols. 2 & 3, July 2000-December 2002.

<sup>14</sup> Kuntala Lahiri-Dutt, 'Energy Resources: Will it be the last frontier in South Asia?' ASARCK Working Paper on 'South Asia: Integrating and Looking East?' 25-26 September 2006 available at: [http://rspas.anu.edu.au/papers/asarc/WP2006\\_10.pdf](http://rspas.anu.edu.au/papers/asarc/WP2006_10.pdf), accessed on 19 April 2008.

<sup>15</sup> For instance, Local Government Engineering Department (LGED) and the Institute of Fuel Research and Development (IFRD) have improved some qualitative stoves which save 50-70 per cent of fuel compare to the traditional ones. Besides, Khulna University of Engineering and Technology conducted development work with the assistance of SIDA to install about 19,596 biogas plants. For details, see; A.K.M Sadrul Islam, Mazharul Islam & Tazmilur Rahman, 'Effective Renewable Energy Activities in Bangladesh', available at [http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6V4S-4H5MYGJ2&\\_user=10&\\_rdoc=1&\\_fmt=&\\_orig=search&\\_sort=d&view=c&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_userid=10&md5=316b342b5468c0061cdb49a621a4dbce](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V4S-4H5MYGJ2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=316b342b5468c0061cdb49a621a4dbce), accessed on 03 May 2008.

<sup>16</sup> Sk Noim Uddin and Ros Taplin, 'A Sustainable Energy Future in Bangladesh: Current Situation and Need for Effective Strategies, The 2<sup>nd</sup> Joint International Conference on *Sustainable Energy and Environment (SEE 2006)*, 21-23 November 2006, Bangkok, Thailand.

energy resources.<sup>17</sup> The yearly direct solar energy available in the whole country is around 25,610 MT of oil equivalent.<sup>18</sup> For the last 5 years, various researches, development organizations, and institutions with the support of World Bank are working to activate this energy resource.<sup>19</sup> Today, Solar Photovoltaic (PV) is gradually been used especially in remote rural areas for providing electricity to households and small business enterprises. Besides, installations of Solar Home System (SHS) are flourishing due to initial step of micro-credit programme of Grameen Shakti and energy programmes of Infrastructure Development Company Limited (IDCOL).<sup>20</sup>

iii. Wind Power: Currently, wind power is used in coastal areas for generating electricity, though it is in a very preliminary stage. At present 2 MWs of electricity is generated from Kutubdia, one of the offshore areas of country.<sup>21</sup> Besides, using the wind-solar hybrid systems, local government engineering department (LGED) installed 10 kwp schemes located in Saint Martin's Island at the Bay of Bengal. One small unit has also been installed at Kuakata sea beach, an important tourist resort of the country. Besides, in July 2005, the first wind power project was in action on pilot basis at Muhari in Feni that generated 1MW of electricity on a trial basis from four windmills. Despite all, the generation of electricity from wind is as low as 20 kwp in the country.<sup>22</sup>

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<sup>17</sup> Md. Osman Goni 'Solar Electricity at Karimpur, Narsingdhi-Prospects and Problems', *Bangladesh Renewable Energy News letter*, *op.cit.*

<sup>18</sup> J. Hasan 'Energy and Prospect of Alternative Energy in Bangladesh', *Dhaka Courier*, Vol. 19, No. 8, September 2002.

<sup>19</sup> For instance, JAIKA's solar energy project and sustainable rural energy project are gathering solar insulations from different areas to produce electricity.

<sup>20</sup> In 2005, IDCOL installed 50,000 SHS providing about 3 MW of electricity that changed the living standard of people in remote rural areas. For details; see, Ijaz Hossain and M. Tamim, 'Energy and Sustainable Development in Bangladesh', Report on *Sustainable Environment Watch (SEW) 2005-2006*, HELIO International, Bangladesh.

<sup>21</sup> 'Renewable Energy', *The Independent*, 09 May, 2008.

<sup>22</sup> 'Renewable Energy Fact Sheet', *Renewable Energy Information Network (REIN)*, LGED, available at [http://www.lged-rein.org/ret\\_factsheet/factsheet\\_wind.htm](http://www.lged-rein.org/ret_factsheet/factsheet_wind.htm), accessed on 12 June 2007.

iv. Hydropower: Hydropower is not a potential source of energy as Bangladesh has a flat terrain. In 2004, the production and consumption of this resource were significantly even (1.139 billion KW/h). At present, the country is able to get only 230 MW of electricity from Kaptai Lake. In addition to this, a few micro-hydro sites have been constructed in south eastern hilly regions. Furthermore, LGED has recently set up 10 kW micro-hydro plant as an alternative source for local power generation and consumption at Bamerchara in Chittagong.

### **III. Energy Security: Challenges for Bangladesh**

#### ***a. Energy Security – A Conceptual Framework***

Over the last four decades, energy has been a major global security issue. Empirically, the very concept of energy security was changed dramatically since the great oil supply disruptions of the 1970s.<sup>23</sup> Therefore, the traditionalist explained and gave emphasis on security of this resource based on two basic principles, namely ‘physical security’ (i.e. supply and demand).<sup>24</sup> In the context of Bangladesh, it is crucial to explain energy security from these two dimensions as these are core facets to ensure energy security for long term. Since natural gas is the most important non-renewable resource of the country as mentioned earlier, security of energy is closely related to the available supply of this resource in required quantities and at a reasonable price. Besides, access to new reserves and demand projections of the energy resources made from time to time are also very important to meet the rising demand of the people. As shown in Table 1, with an annual growth rate of 4.55 per cent in 2005, natural gas was the fastest growing source of energy among the major fuels and its estimated growth of demand was around 10 per cent a year considering the current gas consumption level (493.61 BCF in the year 2005-2006). In view of the present GDP

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<sup>23</sup> Joseph S. Nye, “Energy and Security” in David A. Deese & Joseph S. Nye (eds.), *Energy and Security*, Ballinger Publishing Company, Cambridge, Massachusetts, p. 3.

<sup>24</sup> On the other hand, insecurity of energy occurs when supply of energy is less than the demand (insecurity=supply<demand). The concept of supply and demand is considered as production and consumption respectively and it was first used by US Energy Information Administration (EIA).



growth rate of 5.5 per cent, demand for gas would go up to 4 BCF per day by 2024-25.<sup>25</sup> Gas could only meet country's demand until between 2016 and 2018. Regarding oil, the projected demand is rising gradually considering 7.4 per cent of growth rate of petroleum products consumption. Due to its limited supply, but high consumption pattern, demand of oil would continue to rise sharply in future. In contrast, the demand of coal resources will be increasing at a slower pace.

**Table 1: Future Energy Demand (4.55 Percent GDP Growth Rate), MTOE\***

Energy Sources	2000	2010	2020	2030	2040	2050
Natural Gas	7.7	14.2	22.9	33.6	45.6	57.1
Oil	3.2	5.9	8.9	12.1	15.4	20.1
Coal	0.3	0.6	1.3	3.0	4.7	5.1
Renewable	0.1	0.2	0.5	0.7	1.3	1.7
Total	11.3	20.9	33.6	49.4	67.0	84.0

\*MTOE: Million Tones Oil Equivalent

Source: Qazi Kholiquzzaman Ahmed *et.al*, *Energy Security in Bangladesh*, Academic Press and Publishers Library, Dhaka, 2005.

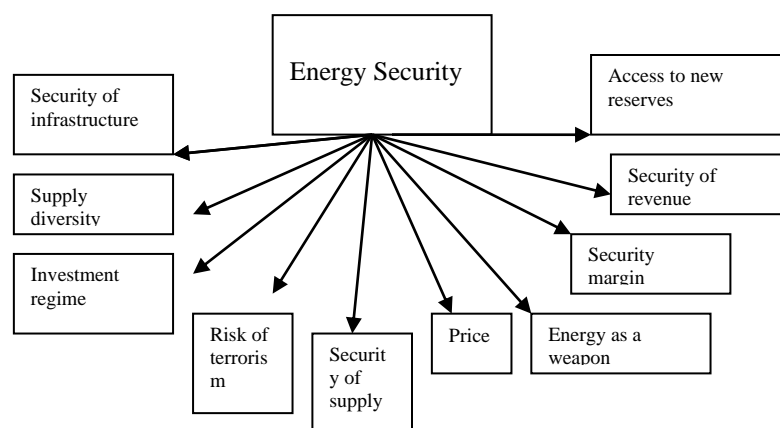
In case of renewable energy, overall demand is in a gradual upward trend but consumption of biomass is slowly decreasing. Regarding electricity, it is projected that maximum demand in 2012, and 2015 would be around 7,732 MW, and 9,786 MW respectively and is expected to increase up to 13,993 in 2020. This baffling scenario of supply and demand shows that the country is facing huge energy inefficiency and the situation would turn into a precarious form in the near future. Thus, based on the predictions of future energy demand and supply in the country after 2030, the country may become fully a net importer.

Apart from the concepts of demand centres and supply sources, three more important aspects were incorporated (geopolitics, market

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<sup>25</sup> Bangladesh approves 20-yr gas sector master plan, asking for fresh exploration" available at <http://www.skyscrapercity.com/showthread.php?t=401751>, accessed on 29 April 2008.

structures and institutions) previously. Nevertheless, in the twenty first century, the concept of energy security is considered from broader perspective and does no longer limit itself with these five traditional elements of energy security. Defining the new energy security paradigm, the term 'energy security' has been articulated in various dimensions. However, in general, the understanding of new energy security is to maintain required access to energy resources without threatening the state's survival at present and in future. As E Bertel pointed out that energy security generally refers to the resource exploration to meet people's demand considering the future generation for a particular period of time including the environmental protection.<sup>26</sup> Likewise, World Energy Council (WEC) emphasizes energy sustainability by asserting environmental impacts. But, keeping away from the issue of environmental protection, Cambridge Energy Research Associates (CERA) defined energy security as an 'umbrella term' encompassing ten key principles which is shown in Figure 1 below.



Source: 'The New Energy Security Paradigm', World Economic Forum, 2006, available at <http://www.weforum.org/pdf/Energy.pdf>, accessed on 05 May 2008.

Among the ten key principles, diversification of energy supply sources is the starting point of energy security.<sup>27</sup> Also, the World

<sup>26</sup> E. Bertel, 'Nuclear Energy and the Security of Supply', *Nuclear Energy Agency*, Vol. 23, No. 2, 2005.

<sup>27</sup> Deniel Yergin, 'Energy Security and Markets', in Jan H. Kalicki and David L. Goldwyn (eds.), *Energy and Security: Towards a New Foreign*

Bank's definition takes into account the socio-economic considerations (e.g. reasonable prices, economic growth and poverty alleviation) and states that "energy security means that a country can steadily produce and consume energy at reasonable prices in order to promote economic growth and, by doing so, to reduce poverty and directly improve the population's living standards by expanding access to modern services in the energy sphere."<sup>28</sup> Thus, based on this analysis, the concept of energy security includes entire social, political, economic and environmental aspects at present.

### ***b. Challenges for Bangladesh***

Are the above mentioned approaches of energy security pertinent to Bangladesh? It is revealed from the above discussion that considering the traditional aspects, the country possesses inadequate reserves of non-renewable energy resources to meet the demand of present and near future. Furthermore, capacity of production of the renewable energy resources is not in line with the growing requirements of industrial and household sectors. At present, this baffling scenario has further been aggravated from certain modern dimensions such as vulnerability of oil supply disruption to ensure supplies and meet the rising demand at reasonable prices.<sup>29</sup> Thus, in the context of Bangladesh, energy security means combination of both traditional and modern indicators. Taking into account of CERA's ten key principles and other modern approaches of energy security, it is necessary to explain how these factors are relevant and have brought further challenges for the country. However, among the ten key principles, five principles (price, supply diversity, security of supply, access to new reserves and security of infrastructure) as well as WEC's environmental issues are identified as key factors for the country's future energy security, and these are as follows:

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*Policy Strategy*, Woodrow Wilson Press and John Hopkins University Press, 2005.

<sup>28</sup> 'Energy Security Master Plan: Liquid Fuels', Department of Minerals and Energy, Republic of South Africa, available at [http://lnw.creamermedia.co.za/articles/attachments/06457\\_energy\\_security\\_strategy.pdf](http://lnw.creamermedia.co.za/articles/attachments/06457_energy_security_strategy.pdf), accessed on 01 May 2008.

<sup>29</sup> A. S. M Bashirul Huq, 'Energy Security for Bangladesh: The Case of Oil and Gas', Seminar on *Power, Energy, and National Security of Bangladesh*, BIISS and BPC, 20 March 2003.

### i. Generation, Transmission and Distribution Crisis

According to Jan H. Kalicki and David L. Goldwyn “a reliable energy supply means predictable supplies that are less and less vulnerable to disruption”.<sup>30</sup> In particular, ensuring electricity supply for every citizen has been a great challenge for Bangladesh government over the last few years. Till now, per capita energy consumption is 165 kwh and only 42 per cent of the total population is within the coverage of electricity network.<sup>31</sup> In 2006, daily power generation capacity was 3000 MW which left a shortage of 2000 MW to meet the country’s overall electricity demand.<sup>32</sup> In 2007-2008, about 247.80 billion CFT gas is required for power generation.<sup>33</sup> This figure shows that the country would face a deficit of at least 41 TCF gas in the next 15 years.

### ii. Dilemma of Exporting Natural Gas

Considering the principle of infrastructural security, it can be said that Bangladesh has very limited infrastructural capacity to explore gas and bear expense of exploration. Demand of gas is sharply increasing at commercial and domestic sectors in the country. Therefore, the question arises, is it possible for the country to export gas without considering its long term sources of energy supply? Conversely, the country is now facing problems in dealing with the multinational companies’ Production Sharing Contracts (PSCs). Although the government signed PSCs with these companies, Petrobangla, a government owned corporation has to purchase gas from the International Oil Companies (IOCs) at a higher rate than the global and domestic markets. Thus, government is now facing huge fund constrains. In this context, it is a great challenge for the government to export gas without confirming the future supply and finding the alternative sources of fuel generation.

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<sup>30</sup> Jan H. Kalicki & David L. Goldwyn, ‘Introduction: The Need to Integrate Energy and Foreign Policy’, in Jan H. Kalicki & David L. Goldwyn (eds.), *Energy & Security: Toward a New Foreign Policy Strategy*, Woodrow Wilson Center Press, Washington, D.C & The Johns Hopkins University Press, Baltimore, 2005, p. 9.

<sup>31</sup> Ministry of Finance, *Bangladesh Economic Review* 2006.

<sup>32</sup> *The Daily Star*, 03 October 2006.

<sup>33</sup> *Bangladesh Economic Review* 2005, *op.cit.*

### iii. Issues of Higher Pay for IOC Explored Gas and IPP Produced Electricity

At present, IOCs are providing 52 per cent of Foreign Direct Investment (FDI) in Bangladesh's energy sector.<sup>34</sup> Generally, with the Production Sharing Contracts (PSCs), Petrobangla deals with these companies, purchases gas from them as cost revival and puts up for selling in the local markets. But, in the name of production and supply, the international companies claim a large amount of profits through high payment rate which is really a concern for the government. Similarly, under Private Sector Power Generation Policy (PPGP) in 1996, the government of Bangladesh endorsed private companies formally called as Independent Power Producers (IPPs) based on certain rules and regulations of World Bank to overcome crisis in power sector. However, since the agreement with IPPs, the cost of electricity has become more than two hundred times higher than the price of previous years because of competitive market products, eventually resulting in great loss of public division.<sup>35</sup>

### iv. Minimising Loss due to Accidents

Diversification of energy and ample supplies are the main guarantors of energy security of a large number of people. It is a fact that some incidents occurred in Bangladesh regarding gas and coal explorations that are real threats for accessing new reserves. For instance, in the gas sector, the country had to lose a significant amount of gas at Magurchara and Tangratila in Habiganj due to the irresponsibility and negligence of the IOCs. As of April 2007, about

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<sup>34</sup> Monzur Hossain, 'Bangladesh: Natural Gas Export', *South Asian Journal*, July-September, 2005, available at [http://www.southasianmedia.net/magazine/journal/9-Natural\\_gas\\_export.htm](http://www.southasianmedia.net/magazine/journal/9-Natural_gas_export.htm), accessed on 02 May 2008.

<sup>35</sup> Anu Muhammad, 'Bangladesh's Integration into Global Capitalist System: A Study on the Policy Direction and the Role of Global Institutions', in Matiur Rahman (ed.) *Globalization, Environmental Crisis and Social Change in Bangladesh*, available at <http://www.members.shaw.ca/motirahman/Globalization%20and%20Bangladesh/Chapter%205.pdf>, accessed on 16 April 2008.

30 to 35 million cubic feet of gas has been burnt per day within 54 hours to reduce the pressure of gas flow of Titas gas field because of the negligence of staffs and mismanagement of the institution.<sup>36</sup> Besides, in August 2006, Asia Energy Corporation, a UK based company explored coal for commercial production that caused massive relocation, killing and unrest of people at Phulbari in Dinajpur district.<sup>37</sup> However, it is anticipated that Asia Energy's plan to explore coal by open pit method would further dislocate around 40,000 villagers and bring serious environmental impacts on the ground water table of the north-western part of the country.<sup>38</sup>

#### v. Challenges of Globalization

Reasonable and stable price is important as it ensures the ability to buy supply for Bangladesh. In fact, the gradual upsurge of global oil price causes a significant threat to the domestic financial system as it poses a negative impact on industrial growth, add inflationary stress and create pressure on the balance of payments. In other words, it might slow down the country's export and investment process. As the demand of oil is elastic, the country has to compete with global market for short term gains and long term sustainability. If the country exhausts its own natural resources, after 2030, it may have to fully depend on imported fuels with unfavourable terms and conditions. At present, the country spends around 4,000 crore taka to import oil annually.<sup>39</sup> In the fiscal year 2005-06, import cost of petroleum in the country was estimated to jump over US\$ 1 billion than US\$ 650 million of the previous year. In this respect, some of the prime energy security concerns emerge from country's increasing rate of import and sharp rise in global oil price.<sup>40</sup> As a result, it has to face some difficulties to cope with the competitive global market.

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<sup>36</sup> 'Sealing of Titas well may cost \$ 3-4m', *The New Age*, 24 April 2007.

<sup>37</sup> Philip Gain, 'Phulbari Asia Energy and Grassroots Revolt', *Dhaka Courier*, Vol. 6, September 2006.

<sup>38</sup> A K M Shamsuddin, 'Phulbari coal: Hydrological environment not favourable for open pit mining', *The Daily Star*, 29 September 2007.

<sup>39</sup> Md. Khurshed Alam, 'Legal analysis on oil-gas exploration inside Bangladesh territorial waters', *The Daily Star*, 02 July 2006.

<sup>40</sup> On January 2007, the price of oil per barrel was \$49.90 that jumped at \$62.9 on March 2007 at 24.8 per cent rate. Experts believe that there will be

#### vi. Demarcation of Maritime Boundary

As the security of energy heavily depends on natural gas, ensuring various options of its supply is crucial. In this regard, offshore energy can be an alternative source to ensure energy security. But, the main problem for the country is the border demarcation with its two neighbouring countries - India and Myanmar. To explore oil and gas, Myanmar occupies a vast offshore area of Bangladesh drawing a line which entered into Bangladesh sea area beside block 18. Similarly, India created a number of blocks with the inclusion of Andaman Island and a vast area of Bangladesh offshore islands. Already, Bangladesh has claimed that some of the parts of block D-23 overlaps block 21 in the Bay of Bengal.<sup>41</sup> Currently, the Energy and Mineral Resources Division (EMRD) has been trying to conduct a seismic survey before inviting tenders for hydrocarbon exploration in the offshore areas for ascertaining possible natural gas and oil reserves. But, the main concern is failure to confirm the real energy reserves in the Bay of Bengal.

### IV. Reaching Out: Bangladesh's Quest for Energy Security

Regional cooperation for ensuring security of supply is one of the significant aspects of a country's economic, foreign, and defence policies. Bangladesh is paying attention to regional countries for energy diversification and long term energy sustainability. Already, few agreements have been signed and some programmes are initiated to strengthen cooperation in this sector.

#### *i. Bilateral Cooperation*

Bilaterally, Bangladesh has cooperation with some Asian countries. For instance, in April 2005, the country signed an agreement with China on nuclear cooperation.<sup>42</sup> Besides, some of the

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insufficient oil to meet the global demand at stable prices. For details, see, Jan H. Kalicki & David L. Goldwyn, *op.cit.*, p.2.

<sup>41</sup> Md. Khurshed Alam, *op.cit.*

<sup>42</sup>Based on this accord, the country is to obtain Chinese support to explore nuclear materials and construct a 600-MW nuclear power plant. For details, see, Mizanur Rahman Shelley, 'Bangladesh Poverty Alleviation Strategy', *South Asian Journal*, Jan-March 2006, available at

regional energy projects are going on bilaterally. For example, Power grid company of India finished a feasibility study on two 220 kv direct current transmission lines between Bangladesh and India. These two neighbouring countries also promoted a pipeline project from Eastern Bangladesh to India for necessary infrastructure development in energy sector. Besides, Bangladesh took various steps for doing power trade with this country. Following this, India's Power Grid Corporation ended a feasibility study in March 1999 on probable exchange of 150 MW of power between these two countries.<sup>43</sup> Points of interconnection will be in Ishwardi, Bangladesh-Farakka, India and Shahjibazar, and Bangladesh-Kurnarghat.

#### *ii. Cooperation with the SAARC Countries*

Since its inception in 1985, SAARC has been trying to work as a platform emphasizing on energy cooperation. At the 12th SAARC Summit, different steps were taken by the leaders to reinforce intra-SAARC energy cooperation under SAARC Integrated Programme of Action (SIPA) approved by Council of Ministers. In addition, some recommendations were proposed including setting up of a SAARC Energy Centre in the 24th session of the Council of Ministers meeting. Besides, in the 13th SAARC Summit held in Dhaka in 2005, emphasis was given to establish a SAARC Energy Centre in Islamabad in order to develop energy resources, energy trade and substitute energy options within the region.<sup>44</sup> Finally, in the 14th SAARC Summit held in New Delhi in April 2007, the leaders stressed the need for accelerating development of renewable energy resources including hydropower, bio-fuel, solar, and wind power.

#### *iii. Cooperation with the BIMSTEC Countries*

The formation of BIMSTEC has opened a new horizon of economic cooperation between the South Asian and South East

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[http://www.southasianmedia.net/Magazine/Journal/11\\_bangladesh\\_poverty.htm](http://www.southasianmedia.net/Magazine/Journal/11_bangladesh_poverty.htm). accessed 06 May 2008.

<sup>43</sup> *Ibid.*

<sup>44</sup> Abdur Rob Khan, 'Bangladesh and BIMSTEC, A whole new opportunity, but are we up to it?', *The Daily Star*, 15 February 2006.



Asian countries. As one of the founding members of BIMSTEC, Bangladesh has a lot of potentialities to join in Asian economic union. Like Thailand and India, BIMSTEC is the way for Bangladesh to meet its 'Look East Policy' perspectives conceptualized as 'East Meets West'.

Among the six areas<sup>45</sup> of cooperation, one of the significant areas is energy sector as most of the BIMSTEC countries are looking for new areas of cooperation through traditional energy supply, increasing energy efficiency, fostering regional trade and investment. At the First BIMSTEC Energy Ministers Meeting, held in New Delhi in 2005, decision was taken to form regional cooperation through construction of natural gas pipelines and power transmission lines. At present, there are some important projects (e.g. hydro-projects, cooperation in energy infrastructure, energy information centre and energy trading network) going on in the energy sector led by Myanmar with South Asian countries. Besides, under the banner of BIMSTEC, India, Bangladesh, and Myanmar had signed a trilateral agreement in February 2005 regarding gas pipeline.<sup>46</sup> On February 2007, Myanmar government expressed its eagerness to construct a long route through northeast India bypassing Bangladesh. In this regard, Bangladesh tried to include some bilateral issues including trade imbalance with India. But, the latter denied and expressed that bilateral issue should not be the part of trilateral agreement. However, Bangladesh is trying to pursue its demand and continuing to hold talks about the tri-nation gas pipeline project. Before, as an initiative of further cooperation, a framework agreement was signed on February 2004 to make a Free Trade Area among the BIMSTEC countries covering mainly three sectors such as trade in goods and services, and investment cooperation.<sup>47</sup> Bangladesh would get a refinement period in two phases implemented from 2006 and 2011 in fast track and between 2007 and 2017 in normal track.

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<sup>45</sup> Trade and investment, technology, transport and communication, energy, tourism, and fisheries.

<sup>46</sup> *The Financial Express*, 16 June 2007.

<sup>47</sup> Abdur Rob Khan *et.al*, *BIMSTEC-Japan Cooperation in Energy Sector: Vision and Tasks Ahead*, Centre for Studies in International Relations (CSIRD), Kolkata, 2006, p.1.

#### *iv. Cooperation with OPEC Countries*

OPEC is formed with 12 member countries including Algeria, Angola, Ecuador, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, the United Arab Emirates and Venezuela which are controlling 40 per cent of the world's oil demand.<sup>48</sup> Therefore, the rising demand of world's oil is heavily dependent on the available oil supplies of these states. However, in Bangladesh, energy security is also dependent on the oil pricing of global market. Therefore, when oil price becomes high in world market, it creates a pressure on country's balance of payment and economic growth. At present, Bangladesh government deals with OPEC suppliers with credit payment. Indeed, this payment policy is significant for ensuring efficient oil supply from these countries as world oil market often disrupts and fluctuates due to sharp increase of price and cartel of oil supply by the OPEC countries. Besides, OPEC Fund for International Development and Industrial Promotion and Development Company of Bangladesh (IPDC) signed an agreement for 'medium-term line of credit' worth US\$ 5 million in 2005.<sup>49</sup> With this agreement, the credit will permit IPDC to enhance support to the private organisations for reforming various sectors including energy. Apart from these, Bangladesh is harnessing various ways to increase greater cooperation with OPEC. However, in the long run, the country has significant prospects of gas trading if it could connect with Iran-Afghanistan-Pakistan-India gas pipeline proposals. Such regional infrastructure connection may provide a new horizon of cooperation as Iran, one of the significant oil producer countries of OPEC is now within the sphere of SAARC.

#### **V. Prospects for Bangladesh**

In Bangladesh, energy development plans mainly cover one fourth of the population who live in urban areas ignoring the energy security of the rural areas. Therefore, ensuring energy security for all is the core issue of discussion. To ensure long term energy for the

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<sup>48</sup> *The Independent*, 19 April 2008.

<sup>49</sup> 'OPEC Fund supports development bank in Bangladesh', available at [http://www.opecfund.org/news\\_press/2005/pr97\\_2005.aspx](http://www.opecfund.org/news_press/2005/pr97_2005.aspx), accessed on 18 April 2008.

entire population, the country needs to consider the following measures at national and regional levels:

*i. National Level*

a. Improve Energy Efficiency

Increasing energy efficiency is the vital issue to enhance sustainable human development. Although it is a matter of apprehension that energy utilization of the country is very poor, there are number of ways to improve energy efficiency in Bangladesh. For captivating effective top down initiatives in this sector, the government can endorse an energy preservation act to give emphasis on energy efficient technologies. In addition, an action plan can be taken for 10 to 15 years by building partnership with the private sectors and stakeholders to promulgate more investment in this sector. Moreover, new mechanisms and equipments can be endorsed and replaced in renewable and non renewable energy sectors considering feasibilities, cost, and locations. On the other hand, equitable energy distribution, empowerment of marginalised people and greater participation in renewable energy sector are crucial for overall human development. To enhance these, technical education<sup>50</sup> can be provided to rural people to familiarise the new technologies and best use of equipments under decentralised energy delivery schemes.

b. Development of Survey and Mining

It is a fact that natural gas is the most important source of energy that offers security of Bangladesh. Therefore, before taking decision to export it, the country needs to confirm how much gas is there underneath the on-shore and off-shore grounds and whether it is enough to meet the ever rising domestic requirements of most of the people. For both short-and long-term energy sector planning and investment, government should develop an acceptable methodology to predict the likely discovered resource base and the existing gas fields. Furthermore, it can develop its own mining expertise, technology, and provision to curtail influence of IOCs. In this regard,

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<sup>50</sup> For example, provide training especially to the poor women to operate solar stoves to reduce biomass fuel crisis.

the role of Bangladesh Petroleum Corporation is particularly important.

#### c. Increase Use of Coal

In 2006, the total estimated world coal reserve was 909,064 MT, half of which are hard coal. Thus, coal contributes 39 per cent of world's electricity and 30-70 per cent of total electricity in many countries.<sup>51</sup> To diversify the sources of energy supply, coal can be one of the best options instead of gas to produce electricity from the latter in the country. But, it is a great concern that till now, only a single coal-fired power plant is in function for generating electricity in the country. Therefore, government should seriously consider the draft national coal policy which was finalised in 2007 based on proper technologies and strategies to extract further coals and increase its energy efficiency.<sup>52</sup> In addition, before going to its full implementation, government can create a regulatory framework taking into account the environmental hazards. To reduce production cost, government can locate the coal projects near the coal mines at different areas. In addition, it should carefully deal with the PSCs of the IOCs and their proposals about exploration methods considering cost benefit analysis, ecological disasters and health hazards.

#### d. Improve RET and Infrastructure

To make the rural energy secured, RET should be improved and government along with different NGOs should take the responsibility. In this regard, RET can be popularised by taking different initiatives in biomass, solar and wind energy sectors. For instance, regarding solar energy, government can take mandatory projects to install the solar panels so that it becomes less expensive. Apart from the initiatives of Grameen Shakti and Bangladesh Rural Advancement Committee (BRAC), Grameen Bank can extend micro-credit to the cooperative society consisting of 10-12 members to store huge amount of solar energy. For ensuring adequate

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<sup>51</sup> BP Statistical Review of World Energy 2007 and Shahiduzzaman Khan, *op.cit.*

<sup>52</sup> Aminul Islam, 'Draft coal policy finalised', *The New Age*, 15 December 2007.

availability of biomass, more energy plants can be restored in a phased manner near the poultry farms especially in rural areas. Regarding wind power, government can properly use this energy from Khulna to Teknaf. Even in the long run, it can join India's wind power industry like Sri Lanka. Also, the country can utilise the marine energy as it has got 710 km long coastal belt along the Bay of Bengal.<sup>53</sup> It can connect between 2 to 8 meters range of pollution free and renewable tidal power using the easy low cost technology of a tidal wheel in the sluice gates for the development of local energy infrastructure.

## *ii. Regional Level*

### *a. Import Gas from Myanmar*

In February 2008, Bangladesh government gave a proposal to Myanmar to import gas from its nearby offshore blocks particularly from block A-1 and A-3 in the Bay of Bengal.<sup>54</sup> But Myanmar could not accept the proposal as it has already committed to export gas to India and China. Also, Myanmar was not interested to further its export of gas until new reserves are discovered. However, it is a great blow for Bangladesh government to meet up the existing energy crisis and implementing tri-nation gas pipeline project that was agreed in 2005. Nevertheless, in the long run, Bangladesh should carefully handle the issue. For this, government needs to take diplomatic strategies and employ technical and efficient professionals in energy sector in order to maintain good relations with Myanmar on the one hand, and India and China, on the other to settle the issue of exporting gas from Myanmar in the long run.

### *b. Claim to International Sea Bed Authority*

Regarding offshore energy resources, Bangladesh should come to an understanding and redraw the base line with Myanmar and India to determine the sea zones in the Bay of Bengal and remove the

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<sup>53</sup> There are mainly 3 types of marine energy resources of our country: (a) Tidal (b) Wave and (c) Oceanic Thermal Energy Conversion.

<sup>54</sup>Khondkar Abdus Saleque, 'Gas Resource of Myanmar-Beyond Bangladesh Reach?', available at <http://www.shwe.org/docs/gas-resource-of-myanmar-beyond-bangladesh-reach>, accessed on 19 April 2008.

overlapping territorial boundaries with the two coastal states. Besides, before going to offshore exploration, Bangladesh needs to have clear policy prescriptions and sufficient data on the possible reserves in its offshore areas for deep sea hydrocarbon exploration in the Exclusive Economic Zone (EEZ) within 200 nautical miles from the coast. In this regard, a seismic survey can be carried out to explore the offshore resources. In addition, the country should submit its claim to International Sea Bed Authority to come to a conclusion as soon as possible.

#### c. Infrastructural Cooperation with China, Japan, and the European Union

Each year, Bangladesh imports around 3 to 3.5 million tonnes of coal, most of which come from India.<sup>55</sup> But, Indian coal emits a significant amount of sulphur dioxide, sulphur monoxide, carbon dioxide (CO<sub>2</sub>), carbon monoxide, black smokes and other pollutants during combustion. Therefore, to reduce high dependency on India and to make energy environment friendly, the country can explore its own potentialities with the help of China, Japan, and the EU. Additionally, the country can strengthen its ties with China as it is the largest producer in the world and would dominate the world's coal market over the next 25 years.<sup>56</sup> At present, importing coal from China is not feasible and quite expensive due to uneasy transportation system. But, in the long run, Bangladesh can propose China to set up a road link from Dhaka to Kunming through Myanmar reviving the ancient Silk Route to import coal from this country with less cost. On the other hand, Japan and the European countries are very much well off in technological sectors. As they are now the members of SAARC, Bangladesh can receive cooperation from these countries to improve its poor infrastructure and mining capabilities in coal and gas sectors.

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<sup>55</sup> *The New Age*, 29 May 2005.

<sup>56</sup> China produced 114,500 MT of coal which was 38.4 per cent share of world total in 2006. For details, see, BP Statistical Review of World Energy 2007, *op.cit.*

#### d. Cooperation with India, Nepal and Bhutan

In Bangladesh, ensuring access to electricity for entire population by 2020 is the avowed goal of the government. But, it would be a gigantic task without regional cooperation. Since demand for electricity would be five times greater in 2020 than the existing demand of 5000 MW, discussions have been in progress for few years about the possibility of Bangladesh involving in Sapta Kosi Multipurpose High Dam (SKHD)<sup>57</sup> with India, Nepal, and Bhutan. Although Nepal and India are already in cooperating stage, Bangladesh remains at the planning level. Therefore, the country can involve with the regional grid strategy connecting these countries for making its energy more efficient and cost effective. Besides, for overall financial and technological gains, the country needs to develop its RET manufacturing and sufficient data base of demand and supply of energy. Furthermore, the country can develop some feasible project models either bilaterally or pool based to ensure larger supply during peak times and enhance the varied sources of energy within the region.

#### VI. Conclusion

None of the basic needs can be fulfilled without energy. Therefore, it is closely related to security issues. At present, significant amount of gas, coal, and biomass resources are contributing to the total energy requirements of the country. Considering demand and supply condition, increasing use of gas and declining trend of biomass consumption compared to the previous years, Bangladesh will face formidable challenges in energy sector in the near future. Presently, various challenges relating to export of gas, environmental threats due to several accidents in gas and coal sectors and high oil price in global market have made the scenario more dreadful. Indeed, greater substitution with internal sources of

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<sup>57</sup> SKHD is a proposed world's second highest dam (269 m. high) situated in Koshi River on the eastern part of Nepal. The substantial capacity of electricity generation from this dam is 3000-3500 MW. However, the project can solve the triple problems of Bangladesh, such as reduce shortage of water and hydroelectricity, annual flooding in plains, and salinity. For details, see, Qazi Kholiquzzaman Ahmed, *Potential for Sharing of Common Regional Resources in the Eastern Himalayan Region*, BUP, Dhaka, 2004.

alternatives like bio-fuel, wind power and most importantly solar energy are crucial to reduce stress on foreign reserves. Apart from these, for overcoming typical constraints and balancing the subsistence economy, the country is now looking for harnessing new and renewable sources within and beyond the country. Therefore, potentials of SAARC, BIMSTEC and OPEC countries can be unlocked to serve its future energy demand. Though some initiatives have been taken so far, these are at a nascent stage till now. Thus, certain initiatives at national, regional and extra-regional levels should be taken for the country's long term energy sustainability.



### Annexure

#### Annex 1. Non renewable Energy Scenario of Bangladesh, 2004

Natural Gas (Trillion Cubic feet)/Year			Coal (Million Short Ton)/Year			Oil (Million Barrel)	Oil (Thousand Barrel Per day)	
Reserve*	Production	Consumption	Reserve	Production	Consumption	Reserve**	Production	Consumption
15.391	462.626 BCF	462.626 BCF	1,054	0	0.771	28	6.2	85

\* Figure as of 2005.

\*\* Figure as of 2006.

Sources: *BP Statistical Review of World Energy*, June 2006, London; and *Oil and Gas Journal*, Energy Information Administration-International Database, February 2006.

#### Annex 2: Offshore Gas production (2000-2006)

Year	Production (Sangu Gas Field) (MMCM)*	Sale (MMCM)*	Value (Million Taka)
2000-2001	1354.933	1063.750	5731.91
2001-2002	1379.748	1024.190	6219.77
2002-2003	1465.786	1160.959	7001.23
2003-2004	1480.421	985.632	5930.62
2004-2005	1341.173	969.033	6110.29
2005-2006(till March)	1211.682	788.270	5375.45

\*MMCM=Million Million Cubic Meter

Source : Petrobangla, MIS Report 2006.

#### Annex 3. Total Coal Reserves in 2005 from Different Underground Depth

Areas	Year of Discovery	Reserves, Million Tonnes (MT)
Jamalganj	1962	1053
Barapukuria	1985	390
Khalaspir	1989	143
Dighipara	1995	400
Phulbari	1997	572
Total		2558

Source: Shahiduzzaman Khan, *op.cit.*, & *The Financial Express*, 27 December 2006.

**Annex 4. Renewable Energy Scenario of Bangladesh, 2004**

Hydro electricity (billion kilowatt- hours, net)		Nuclear Energy (billion kilowatt- hours, net)		Others*(billion kilowatt- hours, net)	
Producti on	Consump tion	Production	Consum ption	Produc tion	Consumption
1.139	1.139	0	0	0	0

\* "Others" include geothermal, solar, wind, and wood and waste electric power generation.

Source: US Energy Information Administration (2005).