

Renewable Energy Technologies in Bangladesh

Country Status (Revised 2005)

Made by Grameen Shakti in the framework of the Danish-South Asia Cooperation project 2005-06
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Bangladesh is situated between 20.34 - 26.38 degrees north latitude and 88.01 – 92.41 degrees east, which is an ideal location for solar energy utilization. Daily average solar radiation varies between 4 to 6.5 kWh per square meter. Maximum amount of radiation is available on the month of March and April and minimum on December and January.

Bangladesh at a Glance

Area	: 1,43,547 Sq. km.
Population	: 140 million
Main occupation of the people	: Agriculture
Number of district	: 64
Number of Upazilla	: 460
Number of Villages	: 68000
Average temperature	: 27 to 32 degrees
Average rainfall	: 2250mm

Bangladesh is a country with one of the lowest per capita and faces formidable development problems. The economy of Bangladesh presents perplexing paradoxes. In spite of its huge manpower resource and fertile land Bangladesh is one of the underdeveloped countries in the world. Environmental degradation (especially indiscriminate cutting of trees), misuse of biomass, and drying up of water-bodies are creating constraints for the poor in the rural areas. Energy is vital for economic and social development of any country. Energy is considered to be one of the essential inputs for overall improvement. The applications of small-scale photovoltaic systems have been a very recent phenomenon in rural areas of Bangladesh. Over the years significant technological advances have been made in developing renewable energy technologies, especially in the field of solar photovoltaic and biogas energy.

It is important to note that the approach of promoting photovoltaic technology in Bangladesh has been different from other countries like India, Nepal and countries in Latin America. One important difference is that Bangladesh has taken a more commercial than those countries where number of systems installed are much higher but the programs are heavily subsidized by the government and donors.

Rural Energy Needs

More than 80% of total population of the country lives in rural areas. At present major portion of total energy needs is met by locally produced biomass fuels which is mostly consumed in the house hold sector for cooking, ongoing rural electrification program meets a small portion of total energy needs. For overall national development there is a need to pay special attention so that the energy needs of rural areas for subsistence and productive requirements (e.g. agriculture, industries, transport) are met on a sustainable basis.

Different types of renewable energy technologies application suitable for Bangladesh are:

Solar Photovoltaic (SPV)

- Solar home system (SHS)
- Rural market electrification
- School electrification
- Health clinic/hospital electrification
- Cyclone shelter electrification
- Micro enterprise
- ICT Training center electrification
- Mobile phone charging

Solar Thermal

- Hot water system for domestic use
- Hot water system for commercial purpose
- Dryer for preservation of vegetables, fish, fruit etc.

Biogas

- Biogas for domestic cooking, lighting and fertilizer
- Biogas from poultry waste for electricity
- Biogas gasifiers

Hydropower

The scope of hydropower generation is very limited in Bangladesh as the country consists of low and flat lands except some hilly regions in the north and northwestern part. The only hydro power station of the country, the Karnafuly Hydro Power Station with a generating capacity of 230 MW by 7 units, is located in Kaptai, across the river Karnafuly.

Solar Energy

Solar energy has been used in Bangladesh for centuries in a variety of economic activities such as drying of washed clothes, food grains, fish, vegetable, raw jute etc and evaporation of saline water for salt production. There are various activities in rural Bangladesh which totally depend on the use of solar energy if these could be performed more quickly and efficiently by using simple devices, it would increase productivity without making and demand on commercial energy sources. In Bangladesh research and development work to harness solar energy in the form of heat has been going on for many years at Dhaka University, Bangladesh Agriculture University, BUET, Solar Park of Dhaka College and BCSIR Laboratories.

Wind Energy

The long term wind flow in Bangladesh, specially in islands and in southern coastal belt of the country indicate that the average wind speed remains between 3 to 4.5 m/s for the month of march to September and 1.7 to 2.3 m/s for the remaining period of the year. There is a good opportunity in island and coastal areas for the application of windmills for pumping and electricity generation. A number of small wind generators have been installed by various agencies in coastal areas. These include wind generators installed by Grameen Shakti at its Chakaria shrimps farm, BRAC and GTZ (a German NGO). BRAC alone has installed 11 wind turbines at various coastal areas. These are small low cutting, DC operation type systems, supplying power to the target group to improve their quality of life.

Summary of the current utilization of Solar Energy Technology in Bangladesh are shown in which has been compiled from different sources.

Stakeholders	Number of systems installed (SHS) and locations	Installed capacity (Approx.)
1. Grameen Shakti	42,000 SHSs all over the country	2150 kW
2. Bangladesh Rural Advancement Committee	10,456 SHSs all over the country	300 kW
3. Bangladesh Power Development Board	Centralized system at Juraichari, Rangamati District	54 kW
4. Local Government Engineering Department	Coastal Cyclone Shelters and remote off-Grid areas	53 kW
5. Bangladesh Council of Scientific and Industrial Research	82 Systems	1.5 kW
6. Rural Electrification Board	Narshingdi District	62 kW
7. TMSS	300 Solar Home Lighting System	17 kW
8. CMES	618 Solar Home Lighting System	33 kW
9. COAST Trust	352 Solar Home Lighting System	17 kW
10. Integrated Development Foundation	300 Solar Home Lighting System	16 kW
11. Srizony Bangladesh	1,272 Solar Home Lighting System	65 kW
12. Shubashati	350 Solar Home Lighting System	17 kW

Energy Scenario of Bangladesh

- ❖ Only 30% (10% rural & 20% urban) of the people are receiving conventional electricity and 70% are deprived of it.
- ❖ Due to the shortage of electric power, development of the agriculture and industrial sectors are hampered.

- ❖ For remote rural areas where there still exists no infrastructure for conventional energy supply, different forms of sustainable energy system will be more adaptable and well suited.
- ❖ Growth of population and industries has significantly contributed to the increase of demand for energy.

Potential

Bangladesh has a plentiful supply of renewable sources of energy. These sources are biomass (including biogas and solid waste), solar energy, tidal and wave.

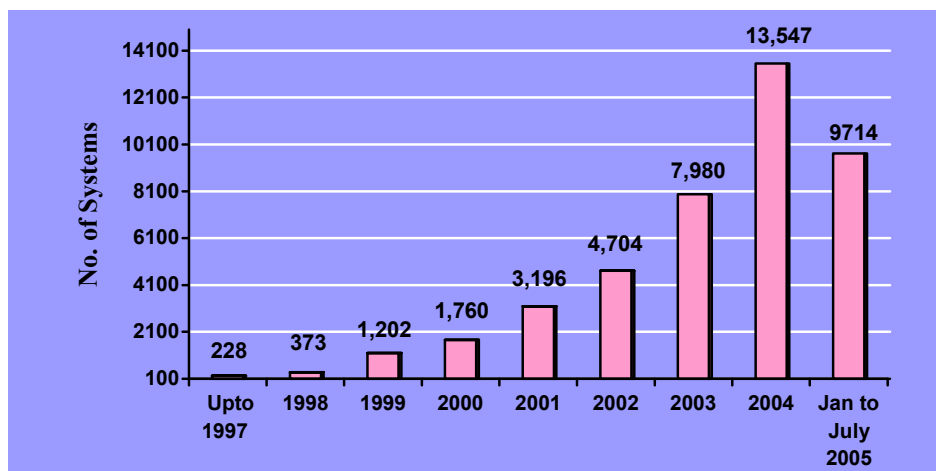
The hundred plus miles long coastal areas and hilly sections provide ample wind for wind turbines.

Waterways of varied forms and speed provide ample wave and gravity driven water flow for ecologically balanced hydroelectric generators.

The lush vegetation provides ample photosynthesis and biomass for fuel for a variety of purposes.

Also, more than two-thirds of the land area is grid free where decentralized applications of various renewable energy technologies have been proven to be the most cost-effective options for generating electricity and heat.

Progress of Grameen Shakti (Installed Solar Home System)



How Renewable Energy Relate to Income Generating Activities

- ❖ Children's education and other home activities have improved.
- ❖ It provides entertainment facility to the SHS customers.
- ❖ Increased income due to extension of working hours after dusk in the individual purposes such as tailoring shops, saw mill, grocery shop, small industries etc.
- ❖ Women are getting opportunities to earn extra money by utilizing their time after dusk by sewing or poultry farming.
- ❖ PV system has opened up new opportunities for employment.

Linkage of the Program

Creates new business opportunities for spare parts of SHS and other components of DC appliances like Radio/TV repairing shop etc will be increased. Metal workshop will be developed to produce the framing structure and mounting pole of the solar module.

Local transportation business will be grown to transport the system and accessories into the remote areas.

New business opportunity for the accessories of SHS like fluorescent lamp, ballast, battery water.

Mobile phone van shop has developed.

Development of Small & Cottage industries.

Primary health care.

GS has developed few programs for the rural people to meet their minimum need of electricity and gas.

Using cow dung or similar organic material people can produce biogas plant in their own premises. It will save the money, health, tree and environment.

NGO Capacity Building for Poverty-Reducing Sustainable Energy Solution in South Asia

Status of different forms of energy that poor use in Bangladesh

Cooking purpose: Biomass is the most significant energy source in Bangladesh, which accounts for 65% of the total final energy consumption in Bangladesh. The main sources of biomass fuels are – (a) Trees-wood fuels, twigs, leaves, plant residues (b) Agricultural Residues - paddy husk, bran, biogases, jute stick etc. and (c) Livestock -animal dung.

Lighting purpose:

Poor people are using kerosene for lighting purpose.

Problems With Different Forms of Energy

Most of the rural people do not have access to the grid electricity and to the modern cooking technologies.

In the case of cooking, biomass is used very widely in Bangladesh that pollutes the environment and creates serious health hazards.

Because of lighting problem education of the children is hampered badly. Rural people can't do any development activities after dusk.

The rural children spend most of their time in collecting dried leaves, crops and other woody biomass instead of going to school. Even their parents allow them to do so because they do not have other cheap resources for cooking.

Rural people use mud made stoves for cooking as a result the energy cannot be used properly. These stoves create so much smoke and various kinds of diseases.

Barriers for Increase the use of SET in Bangladesh

- ❖ Rural people have lack of idea about sustainable energy.
- ❖ The rural uneducated people do not have primary health education, so that they cannot understand the bad effects of using biomass in wrong way.
- ❖ There is not much campaign or awareness programs for the sustainable energy consumption.
- ❖ The decision makers, who are urban dwellers, don't feel the necessity of sustainable energy.
- ❖ NGOs working in Bangladesh are not sufficient or they do not have enough financial backup to promote the use of sustainable energy in the extreme rural areas.
- ❖ Renewable energy is cost effective for rural people. So they cannot afford it.
- ❖ NGOs have lack of technical know how people related to sustainable energy technology.
- ❖ There are not much training materials and trained persons for technical backup support.
- ❖ Natural disasters are one of the barriers for promotion of sustainable energy.
- ❖ In our country financing sources are not interested in sustainable energy technology.
- ❖ Installation and maintenance cost of SHS are high due to bad communication and scattered localities.

Political Support in promotion and implementationIn 1998, The Government of Bangladesh (GOB) lifted import duty and Value Added Tax (VAT) from solar photovoltaic and wind turbines. Solar PV program of different government bodies (BPDB, LGED, REB) are basically subsidy driven. At present, under the Biogas Pilot Plant project, the Government of Bangladesh (GOB) gives 7,500 Taka subsidies for a family-size biogas plant, which can be used for cooking and lighting purposes.

- ❖ Government of Bangladesh has adopted a National Energy Policy (NEP) in the year 1996 giving emphasis on the development of renewable energy. The major objectives of NEP are:
 - To provide energy for sustainable economic growth so that the economic development activities of different sectors are not constrained due to short of energy.
 - To meet the energy needs of different areas of the country and the different socio-economic groups.
 - To ensure sustainable operation of the energy utilities.
 - To ensure rational use of total energy sources.
 - To ensure environmentally sound and sustainable energy development programs causing minimum damage to environment.
 - To encourage public and private sectors participation in the development and management of energy sector.
- ❖ Renewable Energy Policy in Bangladesh is on formulation stage. The Power Cell of the Ministry of Power, Energy and Mineral Resources (MEMR) has submitted a "Draft Renewable Energy Policy", which is yet to be approved by the Government of Bangladesh (GOB).

Political Barriers in promotion and implementation

- ❖ Source of Financing is often one of the major barriers before implementing environmentally benign Renewable Energy Technologies (RETs) in Bangladesh.
- ❖ Electric line may be extended any where without pre-plan by the influence of political leader.

In the context of Bangladesh, photovoltaic generation is more promising and viable than wind, mini/micro hydro, wave or tidal electricity generation because the uncertainty in the availability of sunlight and difficulty in its conversion are very much less though the capital cost of PV modules is more than that for wind or water power. When compared with electricity generation from conventional sources the PV modules cannot compete on the cost basis but its merits are unique so far as the question of serving the rural and offshore communities at a good number of places in Bangladesh far away from the grid is concerned. Moreover with continued research on semiconductor materials and mass production, the capital cost of PV modules has been falling rapidly and is expected to compete with conventional modes generation by the year 2030.