

# *Renewable Energy*

## *Prospects & Trends in Bangladesh*



Presented By -

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# Introduction

**Bangladesh is heavily dependent upon traditional renewable energy sources and 65% of final energy demand of the country is met by the traditional biomass fuels.**

**Traditionally solar thermal energy has been utilized in different household and industrial activities in Bangladesh. These utilization are mainly open air drying of agricultural products, production of salt from sea water, drying of cloths, fish etc.**

**In the rivers wind energy is utilized in the sailboats.**

**Modern Renewable Energy Technologies (RETs) are mostly in the research, development and demonstration phase.**



# Summary of RETs in Bangladesh

| <b>Technology</b>         | <b>Installed Capacity<br/>(approximate estimation)</b> |
|---------------------------|--|
| <b>Solar Photovoltaic</b> | <b>800 kWp / 15,000 SHS</b>                            |
| <b>Wind Turbine</b>       | <b>20 kW</b>   |
| <b>Wind Pump</b>          | <b>6 nos.</b>  |
| <b>Micro Hydro</b>        | <b>10 kW</b>   |
| <b>Biogas Plants</b>      | <b>10,000 nos.</b>                                     |




# **Institutional Framework**

**There is no national coordinating agency for Renewable Energy sector in Bangladesh.**

**Several government organization (BPDB, LGED, REB, IFRD), academic institutions (BUET, DU, BITs), non-government organizations (Grameen Shakti, CMES, BRAC) and private companies are involved in renewable energy sector in the country.**

**Establishment of Renewable Energy Development Agency (REDA) has been proposed by the National Energy Policy (NEP), 1995 of GOB.**



# Policy Support

**“National Energy Policy (NEP), 1995” of Bangladesh has got guidelines for Renewable Energy Technologies**

**A “Draft Renewable Energy Policy” has been submitted by the Power Cell of MEMR which is yet to be approved by the Government of Bangladesh (GOB).**



# Incentives in the Renewable Energy Sector

In 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 subsidy for a family-size biogas plant which can be used for cooking and lighting purposes.



# Prospects of RETs Applications

## Biogas

Ø An agriculture based country like Bangladesh has huge potentials for utilizing biogas technologies. According to IFRD - there is potential of about four million biogas plants in our country.

## Solar Photovoltaic

Ø There is an existing market size of 0.5 million households for Solar Home Systems (SHS) on fee-for-service basis in the off-grid areas of Bangladesh [World Bank, 1998].

Ø 5,000 rural markets and commercial centres

Ø Different government administrative offices, NGO offices, banks, police stations, health centres, schools

*Continued ...*

## **Wind, Small Hydro, Tidal and Others**

**Small Wind Turbines can be installed in the coastal region and off-shore islands of the country.**

**Ø Micro Hydro Power Plants can be installed in the north-eastern hilly regions and in the existing irrigational canal system with sufficient head.**

**Ø There are scopes of integrated small tidal power plants in the coastal regions.**



# Notable Initiatives

## Projects by Government Organizations

- Ø Biogas Pilot Plant Project by IFRD (20,000 plants within 2004)
- Ø Biogas Project by LGED (1,200 plants)
- Ø Chittagong Hill Tracts Solar Electrification Project by BPDB
- Ø Wind Resource Assessment Program (WRAP) by BPDB
- Ø Micro Hydro Power Plant at Barkal by BPDB
- Ø Diffusion of Renewable Energy Technologies Project by REB
- Ø Feasibility Study & R&D on Renewable Energies by IFRD

## Projects by Private Sector and NGOs

- Ø RET Programs of Grameen Shakti (10,000 SHS)
- Ø Dissemination Program of CMES (Rural Market Electrification)
- Ø Renewable Energy Program of BRAC

## Projects by Educational Institutions

- Ø Dissemination of RETs by Renewable Energy Research Centre
- Ø RET Program of Centre for Energy Studies (CES), BUET

## Projects funded by Bilateral and Multilateral Development Partners

- Ø Sustainable Rural Energy (SRE) Project by UNDP
- Ø Renewable Energy Technologies in Asia (RETs in Asia) Program by SIDA
- Ø Opportunity For Women In Renewable Energy Technology Utilization In Bangladesh Project by ESMAP (35 Women ESCO)
- Ø BUET- Loughborough University Higher Education Link Project by DFID
- Ø Solar and Wind Energy Resource Assessment (SWERA) Project by GEF/UNEP
- Ø Promotion of Renewable Energy, Energy Efficiency and Greenhouse Gas Abatement (PREGA) Project by ADB
- Ø Rural Electrification and Renewable Energy Development Project (64,000 SHS within 2008) by GEF/World Bank
- Ø Promotion of Renewable Energy in Selected Rural Areas of Bangladesh by GTZ



# **Solar PV Applications in Bangladesh**

**Different Solar photovoltaic (PV) applications are gaining acceptance as a technology for electricity generation in remote and rural areas of the country, including-**

- Ø Solar Home Systems (SHS)**
- Ø Rural Market Electrification**
- Ø School Electrification**
- Ø Health Clinic / Hospital Electrification**
- Ø Cyclone Shelter Electrification**
- Ø Micro enterprise (grocery shops, tailoring shops, clinics, restaurants, sawmills, rice mills, cellular phone services, barber shops) Electrification**
- Ø ICT Training Centre Electrification**
- Ø Water Pumping**
- Ø Signaling**
- Ø Remote Telecommunication**
- Ø Remote Rainfall Measuring Station**

**Key solar PV installations of the country are listed below -**

- 1) Bangladesh Power Development Board (BPDB) installed the first solar photovoltaic installations in Bangladesh In 1981. 55 solar powered signalling lights were installed on 11 towers of the East-West Power Interconnector in Aricha. Still the solar panels are operating satisfactorily.**



- 2) In 1983, Bangladesh Inland Water Transport Authority (BIWTA) installed 125 solar-powered beacon lights in different parts of Bangladesh to identify the marine routes at night.**
  
- 3) In 1988, Bangladesh Atomic Energy Commission carried out Solar Photovoltaic Pilot project at Sandwip island, where a solar-powered beacon light was installed on top of a watch tower, solar-powered refrigerators in a veterinary hospital for storing life saving vaccines, and solar light and microphone in the local mosque. But all of these systems were destroyed in the 1991 cyclone.**

4) On June 1996, **Grameen Shakti (GS)** came into existence as a renewable energy company. The main program of GS is its **Solar Photovoltaic Program**. GS has already installed 10,000 **Solar Home System (SHS)**

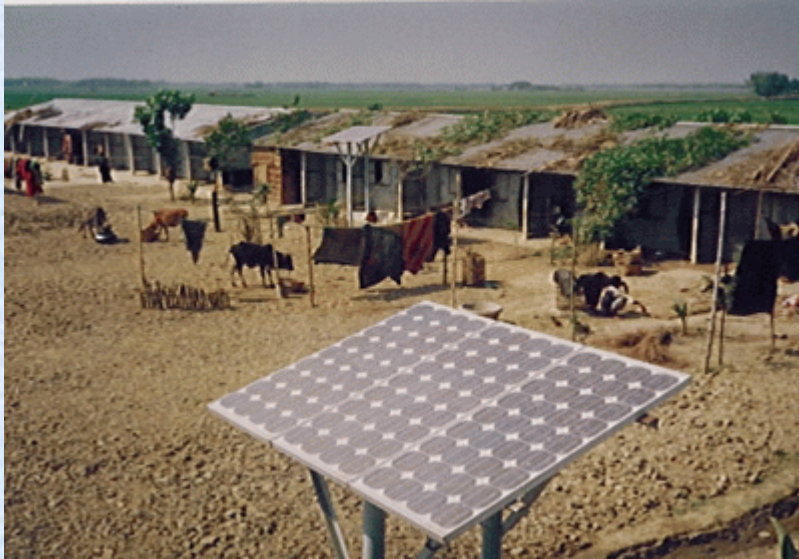


5) On June 1997, **Rural Electrification Board (REB)** implemented the largest solar PV electrification project for rural households and commercial enterprises at a remote island in Narsingdi district. This pilot project served about 900 households of the island community.



**6) Within the overall framework of SEMP (Sustainable Environmental Management Programme) sponsored by UNDP, Local Government Engineering Department (LGED), has embarked on a program on Sustainable Rural Energy (SRE) on October 1998, for Rural Energy Technologies demonstration and transfer.**

**Already a number of Solar Photovoltaic (SPV) installations are operating successfully in different parts of the country demonstrating innovative application of the technology for improving the quality of life in the off grid rural Bangladesh.**



## **Solar Electrification In Ashrayan**

**Location : Baradubi, Nalitabari,  
Sherpur**

**Beneficiary : 60 Households**

**System Capacity : 1.725 Kw**

**Appliances : 10 watt/family,  
power for TV in community  
centre**

## **Solar Market Electrification**

**Location : Abaipur,  
Sailkupa, Jhenaidah**

**Beneficiary : 50 Shops**

**System Capacity : 1.8 KW**

**Appliances : 10 watt/shop**



## **Solar Electrification in Community Clinic**

**Location : Kamarul, Terokhada, Khulna**

**Beneficiary : Improved health care for  
50,000 people in the locality**

**System Capacity : 1.5 KW**

**Appliances : CFL Lamp, OT Lamp, Refrigerator,  
Dc Fan, TV**





# Wind Energy Applications in Bangladesh

The Bangladesh Meteorological department has wind speed measuring stations in towns and cities. Data from earlier measurements and analysis of upper air data by CWET India show that wind energy resource of Bangladesh is not good enough ( $>7$  m/s) for grid connected wind parks [GEF 2001]. At present, several wind resource assessment program (WERM, SWERA, WRAP of BPDB) is ongoing in the country. From the previous studies it can be inferred that the small wind turbines can be installed in the coastal regions of the country.

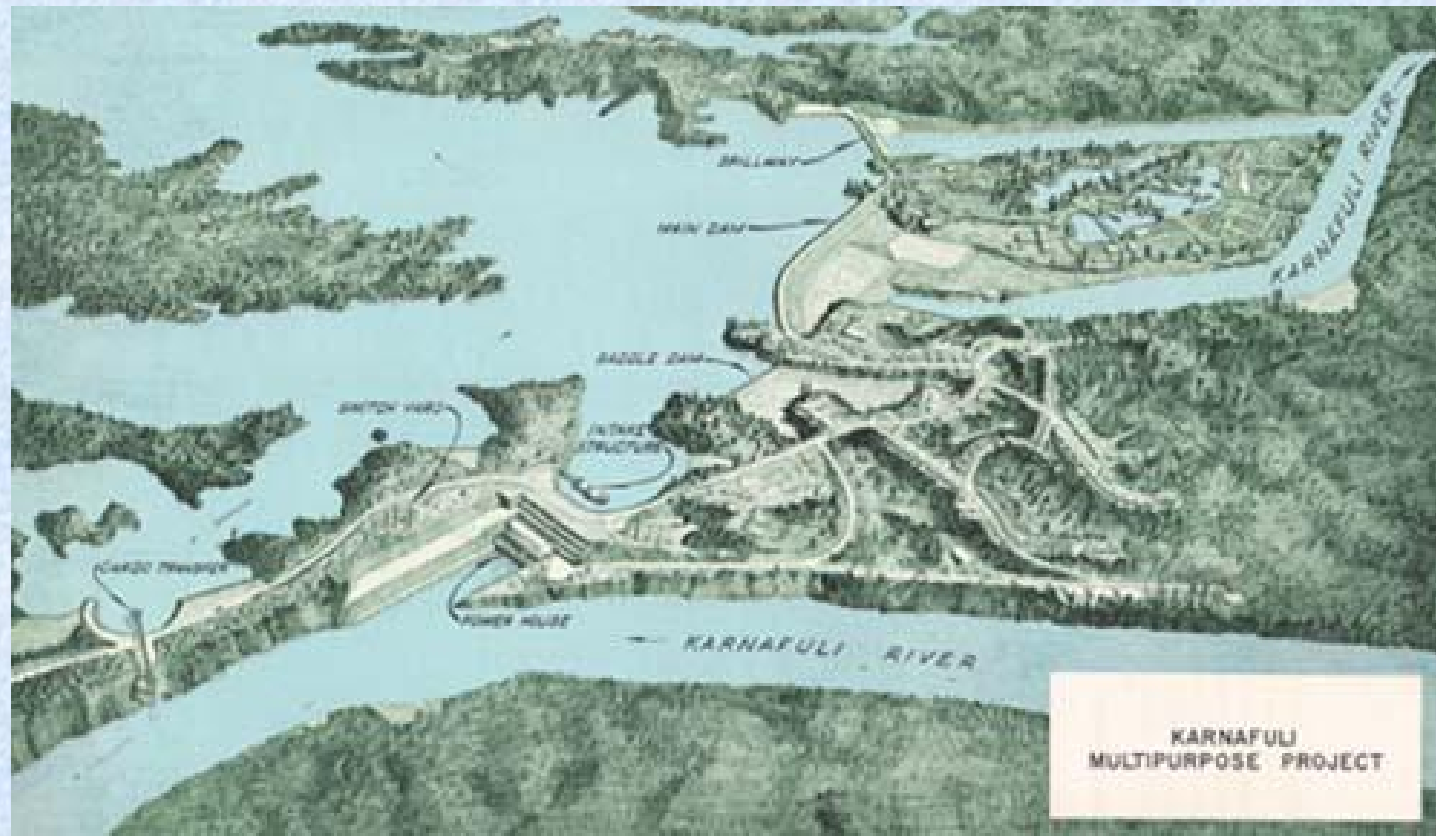
Several organizations have installed low capacity wind turbines, mainly for battery charging in the coastal region of Bangladesh. However, progress in the wind energy sector of Bangladesh is not impressive. However, summary of wind turbine installations in the country are presented in the following Table for illustrating an overview.

## Table : Wind Turbine Installations in Bangladesh

| Organization    | Type of Application | Installed Capacity (Watt) | Location                              | Present Status |
|-----------------|---------------------|---------------------------|---------------------------------------|----------------|
| Grameen Shakti  | 3 Hybrid            | 4,500                     | Grameen Offices in the Coastal Region | Functioning    |
|                 | Hybrid              | 7,500                     | Cyclone Shelter in the Coastal Region | Functioning    |
| BRAC            | Stand-alone         | 900                       | Coastal Region                        | Functioning    |
|                 | Hybrid              | 4,320                     | Coastal Region                        | Functioning    |
| Bangladesh Army | Stand-alone         | 400                       | Chittagong Hill Tracts                | Functioning    |
| IFRD            | Stand-alone         | 1100                      | Teknaf                                | Functioning    |
|                 | Stand-alone         | 600                       | Meghnaghat                            | Functioning    |
| LGED            | Wind-PV Hybrid      | 400                       | Kuakata                               | Functioning    |
| Total           |                     | 19,720                    |                                       |                |

# Hydro Power Applications in Bangladesh

At present only 230 MW of conventional hydro power is utilized in the **Karnafuli Hydro Station**, which the only conventional hydro-electric power plant in the country operated by Bangladesh Power Development Board (BPDB).



## **Micro Hydro Power Plant of Aung Thuwi Khoi**

**Several reconnaissance surveys and studies have been conducted in the past for installing small hydro power plants in the country, but so far only one hydro power plant has been installed by a tribal man Aung Thuwi Khoi Marma of Mongjaipara village in Bandarban has installed the first micro hydro power plant in Bangladesh through indigenous technology (wooden water wheel which is driving locally procured generator).**

**The electricity from his 10 kW power plant was first supplied to a local Buddhist temple. At present he is trying to provide electricity to 140 families of his village from the micro hydro power plant at his own cost. Thuwi is basically a owner of a rice mill who repairs his mill himself. He had dream of supplying hydroelectricity with his own technology to electrify his co-villagers. To make his dream true, he has constructed a weir on a hilly canal at his village and soon started producing hydroelectricity.**

*Figure : Micro Hydro Power Plant of Aung Thuwi Khoi*





# **Biogas Applications in Bangladesh**

Among all the renewable sources of energy, only biogas has drawn Government attention and a systematic development has been carried out in this sector. Institute of Fuel Research and Development (IFRD) of BCSIR is carrying out different pilot project since 1973. Almost all the successful research and development activities in the country have been carried out by them.

Different government organizations such as Local Government and Engineering Department (LGED), Department of Public Health Engineering, Department of Livestock Services, Bangladesh Agricultural Extension Department and non-governmental officers were trained up in BCSIR campus to help the implementation of the programme. Another project of LGED is also in progress for 10,000 plants, of which 2,000 plants are community based.



# Barriers

## 1) Policy Barriers

Lack of legal, regulatory and policy framework

## 2) Institutional Barriers

No coordinating agency

## 3) Technical Barriers

Lack of standards and quality control

## 4) Market Barriers

Limited knowledge on the RE market potential

## 5) Financing Barriers

High upfront cost / Absence of credit facilities for entrepreneurs

## 6) Information Barriers

Lack of information about renewable energy resources

## 7) Human Resource Barriers

Lack of skilled manpower for resource assessment & design



# Lessons Learned

Renewables are slowly finding a **niche market** in Bangladesh. Still there are lots of **barriers** and the expected outcome from the past initiatives are not encouraging as the total utilization level is meager.

**Time-bound targets** for mass dissemination of different renewable energy technology options have to be adopted by the Government of Bangladesh (GOB) for fulfilling its obligation of universal electrification program by the year 2020. GOB should take different Sustainable Energy Technologies (Renewables, Energy Efficiency etc.) very seriously for achieving this ambitious goal

GOB should create the much talked about **Renewable Energy Development Authority (REDA)** immediately to act as a focal point in the renewable energy sector of Bangladesh. REDA should be engaged to remove the barriers prevailing in the RETs sector.

A tropical sunset scene with palm trees and a body of water. The sky is a warm, golden-orange color, and the water below reflects the light. Several palm trees are silhouetted against the bright sky. The text "Thanks for your PATIENCE" is overlaid in the center.

Thanks for your  
**PATIENCE**