

Sustainable and Renewable Energy Development Authority (SREDA)  
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## DRAFT POLICY REPORT

### *Consultancy Services to Revise 'Renewable Energy Policy, 2008'*

SUBMITTED BY



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**RENEWABLE ENERGY POLICY (DRAFT)  
OF  
BANGLADESH**

**Sustainable and Renewable Energy Development Authority (SREDA)**

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Bangladesh**

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## **1.0 INTRODUCTION**

### **1.1 Preamble**

In context of global warming and depleting trend of fossil fuels, securing a steady and economic energy supply is a major issue for successful governance. The Government of Bangladesh (GOB) initiated development of Renewable Energy Sector with the evolutionary approach by enacting the strategic policy, The Renewable Energy Policy of Bangladesh, 2008, to increase the deployment of RE technologies in Bangladesh. RE promises a higher proportion of the national energy supply mix and helps ensure universal and affordable access to electricity in all regions of the country. The GOB's strategic objectives of Energy Security, Reliability and Availability of modern electricity, Environmental protection, Sustainable development, Social equity and mitigation of Climate changes and other related issues emphasized the revision of RE policy 2008. An updated Policy with the revision of the earlier Policy, aims to create a conducive environment for the sustainable growth of RE Sector in Bangladesh.

Renewable Energies have been seen significant growth in different parts of the world in the last decade in terms of deployment, technological advancements and cost competitiveness. Experience under RE Policy 2008 coupled with international best practices provided the basis for a more comprehensive framework for RE Policy, 2022. It has an expanded scope encompassing all alternative and renewable energy sources, competitive procurement and also addresses off-grid solutions, and rural energy services. It carries forward most of the liberal and attractive incentives of RE Policy 2008 with addition of more incentives to maintain the investors' confidence, and places greater emphasis on rapid growth of grid-connected RET applications as well as a programmatic development of distributed RE power generation market on more competitive terms.

As RE becoming cheaper generation source for electricity (especially solar and wind energy), efforts are to be made to initiate gradual replacement of existing conventional power generation capacities with renewable power generation capacities. The key advantage of conventional power generation is high Plant Load Factor (PLF), firmness and flexibility in power supply. In order to have same attractiveness, RE sources shall have these three attributes and the Renewable Energy Policy 2022 may promote such RE projects like solar-wind hybrid with energy storage or any other renewable energy with storage system which shall provide high PLF, firmness and flexibility in supply.

Keeping the RE potentials in consideration, Bangladesh Renewable Energy Policy 2022 aims at to make Bangladesh an attractive destination for investors with technological advancement in the RE sector. The focus of the Renewable Energy Policy is to advance the RE market development in the country through resources, technologies, capacity development thus to facilitate Government of Bangladesh in meeting the RE target or any other milestones set thereafter. This policy shows the path to create sustainable future for the country, decarbonizes energy system highlighting RE technology adaptation, climate safe investment & framework needed for combating the transition and challenges.

### **1.2 Scope of the Policy**

This policy covers all projects to be implemented for Renewable Energy, either for the purpose of captive use and/or for selling of electricity to the Public Utility or Captive use or Third-Party sale including under the Renewable Energy Certificate (REC) mechanism subject to provisions of this Policy if the producer wishes to avail any incentives available in this Policy. This includes projects that may be developed in Private Sector, Public Sector, or in Public Private Partnership. To the extent that a consumer wishes to generate power for his/her own use, certain concessions available under this Policy will apply, but are already codified in other regulations or statutory orders and, therefore, do not require any specific action by such a consumer under this Policy. While the policy is structured to cover projects to be inducted in the National Transmission/distribution system, it does cover projects in the Public

utility, or any other privatized utility in the future, to the extent that they wish to avail the concessions provided herein; as the regulator, shall be responsible for ensuring compliance to its procedures for privatized utilities.

The technologies covered under this Policy are both conventional Renewable Energy sources including Solar, Wind, Geothermal, and Biomass, as well as Alternative technologies like Biogas, Waste to energy (WTE), Energy storage systems, Hydro, Ocean/Tidal Waves, as well as all kinds of hybrids thereof. In addition, any proprietary technology, or new technology to be developed during the applicability of this Policy, would also fall under its ambit. Consequently, any project for sale of electricity to a public utility or a private sale shall be able to avail applicable benefits hereof. All relevant parties shall be bound by the terms of this Policy.

This policy will cover projects for Renewable Energy as well as Alternate Energy Technologies, as follows:

- Solar (PV or Thermal, or any technology that uses heat and/or light of the sun to make electricity)
- Wind (on-shore and off-shore)
- Hydro
- Biomass
- Biogas
- Storage Technologies (Battery systems, compressed gas, pumped storage)
- Energy from Waste (including but not limited to municipal solid waste, industrial waste, sewage, Refuse Derived Fuel).
- Geothermal
- Ocean /Tidal/ Wave energy
- Hydrogen or Synthetic Gas (made from any source except fossil fuels)
- Hybrids of any of the above Technologies

Any technology not identified above but determined by the SREDA to be Renewable Energy or Alternative Energy Technology shall also be included, from time to time.

- a) All Solar, Wind, Solar-Wind Hybrid, Energy Storage, Mini and Small-Hydro, Biomass, Waste to Energy projects and new initiatives/pilot projects established in the Country during the Policy period shall be eligible for benefits under this Policy.
- b) Any individual or company or body corporate or association or society or body of individuals, whether incorporated or not shall be eligible for setting up RE projects, either for the purpose of captive use and/or for selling of electricity to the Distribution Licensee or Third Party including under the Renewable Energy Certificate (REC) mechanism subject to provisions of this Policy and in accordance with the relevant BERG act, as amended from time to time.
- c) This Policy supersedes all the earlier Solar and RE policies issued. This Policy will be applicable to all the RE projects sanctioned prior to the commencement of the Policy and those RE projects in the process of development i.e. if a project developer with Government Order (GO) issued prior to the commencement of this Policy applies for timeline extension or transfer, the applicable timelines, time extension and transfer (including fees if applicable) shall be as per the provisions of the Policy. Similarly, those project applications which are submitted before the commencement date of this Policy, but receive GO on or after the commencement date of this Policy shall have the timelines, time extension, transfer (including fees if applicable) and Performance Bank Guarantee shall be as per the provisions of this Policy. In case of any discrepancies between the provisions of this Policy and earlier Policies for the allotted projects, the Power Division shall examine it on case to case basis, and the decision of Government shall be the final.

### **1.3 Legislative Framework for Policy**

The legislative framework for this Policy includes the following provisions:

Government policies have significant impact on the pace and direction of economic development. It can also create the required enabling environment for the involvement of the private sector and to attract private investments in economic activities. To attain the objectives of electrification through development of conventional and alternative sources of energy, the following policies and legislations are in place:

- The Sustainable and Renewable Energy Development Authority Act, 2012
- The Renewable Energy Policy of Bangladesh, 2008
- BERC Act 2003
- National Energy Policy 2004
- Power System Master Plan 2016
- Net Metering guide lines
- The Electricity Act, 2018
- Perspective Plan of Bangladesh 2021-2041
- 8<sup>th</sup> Five Year Plan July 2020-June 2025
- Mujib Climate Prosperity Plan
- The National Environmental Policy-2018
- Private Sector Power Generation Policy of Bangladesh, 1996
- NDC Action Plan-2021
- Policy Guidelines for Small Power Plant (SPP) in Private Sector, 2000
- The Bangladesh Energy Regulatory Commission Act, 2003
- Policy Guidelines for Power Purchase from Captive Power Plant, 2007
- Policy Guidelines for Public Private Partnership
- Guidelines for Remote Area Power Supply System (RAPSS), 2008
- Policy Guidelines for Enhancement of Private Participation in the power Sector, 2008
- Energy Efficiency and Conservation Rules, 2015
- The Bangladesh Private Sector Infrastructure Guide Lines

As per SREDA Act, SREDA has been created as a nodal Authority of the Government to promote and develop renewable energy and energy efficiency activities in public and private sectors. Besides SREDA, cells/wings departments have been established in different power sector utilities to deal with renewable energy and energy efficiency issues.

Orders/Regulations or any other dispensation issued by the Bangladesh Energy Regulatory Commission (BERC) from time to time shall be applicable to the provisions of this Policy including the Acts passed by Government of Bangladesh. In case of any discrepancy between the provisions of this Policy, Orders/Regulations issued by the BERC will prevail.

#### **1.4 Background**

Current power generation in Bangladesh is mainly reliant on fossil fuels. In light of an impending gas crisis, as national supplies are presently insufficient to meet demand and gas is increasingly being imported to meet demands, the government developed a strategy for power generation to diversify fuel and enhance energy security for the country. In 2008 Bangladesh adopted the Renewable Energy Policy with the mandate to increase the Renewable energy share in the total energy demand of the nation. This is also a step for Bangladesh towards meeting its commitment to the Paris Climate Agreement and relevant treaties. A clear advantage of RE technologies is their amenability to be effective both in centralized as well as decentralized mode of operation, essentially providing energy independence for regional and local mini-grids. So far most of the renewable capacity in the country is based

on hydro power (230 MW) as well as solar home systems. Renewable energy in the form of traditional biomass is the main source of primary energy in the country especially for cooking purposes. Study shows that Solar and Wind energy can play an important role in the country's action plans. The size and economic potential of the other renewable energy resources in Bangladesh are yet to be determined.

This policy spells out ways and means of steering the energy sector in transition to power the nation and its social market economy, aiming at higher levels of stability, security, affordability and sustainability with the least environmental burden and provide a favorable ground for all public and private enterprises, homes and institutions to flourish in a future, where energy will not be a constraint. The focus of this policy is to shift the large dependency on conventional fossil fuel-based thermal power plants to renewable resources. Moreover, global depletion of fossil fuels, increasing cost of purchasing and hassles in importation are the major driving forces behind it. So, the necessity of harnessing energy from renewable resources is becoming a key factor to the country's development. The primary objective of the Renewable Energy policy is to ensure energy security through supplies that are cleaner, secure, economical and reliable, to provide convenient, affordable energy services to support socially equitable development of Bangladesh. Bangladesh is endowed with RE potential which includes solar, wind, biomass, Waste to energy and other renewable energies that can be made for favorable destination of RE investments in Bangladesh.

The Renewable Energy Policy, 2008 of Bangladesh was developed with multiple objectives related to RE implementation. The policy has laid the foundation of a broader aim to increase and promote the utilization of RE in the local domain and helped the nation to increase its renewable energy share for last 14 years. Energy demand has been increased and new energy sources are being added in power generation. The Renewable policy'2008 and other related policies are not comprehensive. The government has to deal with different and conflicting interests with the potential industry players. Such disparities hinder the investment of RE projects. In Bangladesh efficient utilization of renewable energy resources not yet attain a commercial dimensions and hence rational policy dissemination on renewable energy usage is essential. In view of the limitations, the RE policy has been updated.

## 2.0 GLOSSARY OF ABBREVIATIONS/ ACRONYMS/ TERMS AND DEFINATIONS

Unless the meaning is repugnant to the context, the following words shall have the meanings assigned to them.

BERC	Bangladesh Energy Regulatory Commission
BIWTA	Bangladesh Inland Water Transport Authority
BOO	Built-Own-Operate
BPDB	Bangladesh Power Development Board
BPMI	Bangladesh Power Management Institute
BTS	Base Transceiver Station
CDM	Clean Development Mechanism
CERC	Central Energy Regulatory Commission (India)
CSP	Concentrated Solar Power
GOB	Government of the People's Republic of Bangladesh
"GST"	Goods and Services Tax
IDCOL	Infrastructure Development Company Limited



IPP	Independent Power Producer
LGED	Local Government Engineering Department
BB	Bangladesh Bank
MOF	Ministry of Finance
MPEMR	Ministry of Power, Energy and Mineral Resources
NEP	National Energy Policy
NGO	Non-Government Organization
NOC	No-objection Certificate
PERC	Power & Energy Research Council
P2P	Peer-to-Peer
PV	Photo Voltaic
PLF	Plant Load factor
PSMP	Power System Master Plan
PSPP	Pumped Storage Power Plants
RE	Renewable Energy
REB	Rural Electrification Board
REC	Renewable Energy Certificate
RPO	Renewable Purchase Obligation
SHS	Solar Home System
SREDA	Sustainable and Renewable Energy Development Agency
RETs	Renewable Energy Technologies
UNFCCC	United Nations Framework Convention under Climate Change
VAT	Value Added Tax

CDM: The Clean Development Mechanism is a United Nations-run carbon offset scheme allowing countries to fund greenhouse gas emissions-reducing projects in other countries and claim the saved emissions as part of their own efforts to meet international emissions targets.

#### **Kyoto Protocol:**

The **Kyoto Protocol** was an international treaty which extended the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions, based on the scientific consensus that (part one) global warming is occurring and (part two) that human-made CO<sub>2</sub> emissions are driving it. The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. There were 192 parties (Canada withdrew from the protocol, effective December 2012)<sup>52</sup> to the Protocol in 2020.

The Kyoto Protocol implemented the objective of the UNFCCC to reduce the onset of global warming by reducing greenhouse gas concentrations in the atmosphere to "a level that would prevent dangerous

anthropogenic interference with the climate system" (Article 2). The Kyoto Protocol applied to the seven greenhouse gases listed in Annex A: carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF<sub>6</sub>), nitrogen trifluoride (NF<sub>3</sub>).<sup>18</sup> Nitrogen trifluoride was added for the second compliance period during the Doha Round.<sup>19</sup>

**RPO:** Renewable Purchase Obligation (RPO) is a mechanism by which the Electricity Regulatory Commissions oblige entities to purchase a certain percentage of power from renewable energy sources. Entities are generally obligated are Distribution Licensees, Captive Consumers, Industrial Consumers, Significant Commercial & Domestic consumers (based on connected load)

**REC:** Renewable Energy Certificates (RECs) represent the attributes of electricity generated from renewable energy sources. One REC represents that 1MWh of energy is generated from renewable sources. RECs can be used by the obligated entities to demonstrate compliance with regulatory requirements, such as Renewable Purchase Obligations. The REC is exchanged only in the power exchanges approved by ERC within the band of a floor price and forbearance (ceiling) price as notified by ERC from time to time.

Generally there are two categories of certificates:

1. **Solar REC's** issued to eligible entities for generation of electricity based on solar as renewable energy source. Solar RECs include both PV and CSP technologies.
2. **Non-solar REC's** issued to eligible entities for generation of electricity based on renewable energy sources other than solar. Non-solar RECs include renewable energy technologies such as biomass, wind, biofuel, cogeneration & small hydro. Renewable generators meeting some criteria as determined by ERC will have the eligibility to sell REC.

### 3.0 POLICY OVERVIEW

#### 3.1 Vision

Development of an efficient, sustainable, secure, affordable, competitive and environment friendly power system while promoting indigenization of energy resources and development of local manufacturing capabilities in such technologies along with creating the country as a preferred investment destination in the Renewable Energy sector.

#### 3.2 Objectives

- Harness the potential of renewable energy resources and dissemination of renewable energy technologies in rural, peri-urban and urban areas;
- To rapid scale up the renewable energy capacity of the country, in order to contribute to renewable energy target keeping in mind Bangladesh's commitments under international climate agreement.
- To reduce the dependence on fossil fuels and further energy security in the country.
- To promote the utilization of indigenous resources with the development of different projects of RE sources such as available in the country;
- Proper institutionalization with product standardization and cost competitiveness in RE sector.
- To attract investment in the RE sector and development of the country economy;
- To focus RE potential in the Country and the use of available resources for development of RE projects for the purpose of meeting the energy demand within the Country;
- Achieve the targets of sharing renewable energy resources in meeting total electricity generation target or any other capacity targeted thereafter.
- To safeguard the environment by increasing the share of "green" energy in the overall energy mix
- To encourage private sector investment while securing competitive rates of return

- To promote new initiatives and emerging energy technologies in the Country.
- To promote energy storage projects in the Country and to create energy storage market to integrate more RE into the grid and offer grid support services such as peak reduction, curtailment management, contribution to reliability needs, transmission deferral, intraday and seasonal variation management, and others;

### **3.3 Policy Period**

This Policy shall come into effect from the date of issuance and will be valid for a period of 10 years or till a new Policy is announced. This Policy will be evaluated/updated on regular basis to assess its impact, and to ensure inclusion of any new RE market/guidelines of Government of Bangladesh that may evolve during the Policy period.

## **4.0 RENEWABLE ENERGY RESOURCES & TECHNOLOGIES AND POTENTIAL**

### **4.1 SOLAR**

Bangladesh is naturally bestowed with significant solar energy potential. Presently the following technologies are in practice to harness its optimal potential. This policy will focus on the promotion development of following solar energy markets in the country.

#### **4.1.1 Grid connected MW scale solar projects (Solar Park)**

Government has initiated the plan to set grid tied solar based power generation projects in the non-agricultural lands. Power generated from the solar park will be directly feed into the grid on commercial basis. Solar parks developers are being selected on solicited/unsolicited process as IPP and operating as BOO basis.

Mainly two types of lands have been focused for the solar parks, those that are owned by the government but are not being used for agricultural production and the other is the private non-agriculture lands owned by private investors.

- Since many departments like Bangladesh Railway, Roads & Highways, Bridge Authority, Water Development Board etc, also own many unutilized land or open spaces which can be effectively utilized for development of Solar Park. A directive order from GOB is needed for that purpose.
- For managing grid stability, storage system should also be provisioned with the increase of VRE in the system.
- Land zoning may be effective way to prompt the implementation.

#### **4.1.2 Solar Home System**

Solar Home systems (PV) systems were very popular in the off-grid remote area but with the extension of grid lines in most of the off-grid area installation growth of SHS has declined. More than 6 million SHSs of capacity had been installed under different program in the off-grid rural areas. Most cases it is now being used as backup in case of power interruption.

#### **4.1.3 Rooftop Solar**

Rooftop has been identified as one as the potential site for installation solar panels. Most of the Roof-tops in the residential and commercial buildings are lying vacant either fully or partially. Rooftop solar PV system can be an independent source to provide power for the individual requirement as well as to feed power in the local distribution system. Government has issued directives as a pre-condition to get new electricity connection to install solar panel by the consumers to meet their certain percentage of their load. Railway terminal sheds, EPZs, Economic zones, Airport terminals, Educational institutions etc. may also be prospective space for solar rooftop installation without any excess land and grid connectivity.

**a. Rooftop solar with Net Metering**

Net metering is a policy approach designed to encourage distributed renewable energy development by allowing utility customers to generate their own electricity from solar or any other renewable sources and use the electricity produced to offset the amount of energy they draw from the utility grid (sometimes called the distribution grid) and any excess generation can feed into the grid. Customers are only billed for their "net" energy use and receive credit usually in the form of kilowatt-hour (kWh) during a given period. Realizing its importance, the Government of Bangladesh published a net metering guideline in July, 2018 to establish a mechanism for distributed RE integration to the grid. It is expected that huge potential of solar power can be harnessed by Rooftop Solar Net Metering system.

**b. Rooftop solar Except Net Metering**

Rooftop solar PV system for producing power as an independent source to provide power for individual requirement can be without net metering. It is also indeed an effective solution for using a portion of the energy need from renewable source.

**4.1.4 Solar Mini/ Nano grid**

Some off-grid areas of the country areas have been electrified by solar mini-grid system as the government has achieved the goal 100% electrification across the country. According to national database, total 28 nos. of Solar Mini grid were installed in different off-grid area. But as the distribution utilities are rapidly electrifying their own areas, the grid electricity being extended to the areas covered by the mini-grid where it was not planned to do so. In this regard, to ensure uninterrupted power supply at a same price for all, the government has decided to purchase the electricity generated in the solar mini-grids through the respective distribution utility and sell it to the consumers at the rate fixed by government. The Power Division and SREDA are working to set a reasonable tariff for the purchase of electricity generated in solar mini-grids by the power distribution utility.

**4.1.5 Solar Irrigation**

Agriculture is the single most important sector of Bangladesh's economy, which contributes 18.64% of its GDP. Being a country located in tropical delta, irrigation plays a vital role in Bangladesh's agriculture. Solar based alternative energy source can be used for irrigation purpose to ensure food security as well as reduction of CO<sub>2</sub> emission from inefficient diesel-based irrigation system. There are around 1.34 million diesel operated irrigation pumps (DTW – 3000, STW – 1.2 million, LLP – 0.14 million) are working for irrigation, which covers 3.4 million hectares of land. This diesel operated pumps as well as the electricity operated pumps can be replaced by solar pumps. The "Guidelines for the Grid Integration of Solar Irrigation 2020" has been published to promote grid integration of solar pumps so that electricity generated from solar irrigation system can be used for other alternative use as well as can be exported to nearby electricity utility distribution line, if excess than irrigation requirement. <sup>1</sup>

**4.1.6 Solar Charging Station**

The solar charging stations could be feasible way for charging batteries used for Auto-rickshaw, Electric vehicle etc. It is a promising field of using solar energy in transport sector especially for electric vehicle. Along a road side or within the premises of petrol pump the solar charging stations can be installed. A total of 14 no of solar charging station have been installed so far. Learning from its performance evaluation, a customized model of a solar charging station with user friendly environment can be developed.

#### **4.1.7 Solar Street light**

The technology of a Solar Street light is an integrated system of solar panel, a rechargeable battery, lighting fixture and a pole. Solar panel converts solar energy into electricity. Battery stores the electricity generated by the solar panel during the day and provide energy to the lighting fixture during the night. LEDs are usually used as the primary lighting source of solar street lights. All the components are mounted on the top of the pole. Alternately, a number of panels can be installed as a central power source on a separate location and supply power to a number of street lights. Thus solar energy can be used for lighting streets, market palaces, graveyard or other such location.

#### **4.1.8 Solar Drinking Water system**

A Solar-powered system for supplying drinking water can ensure safe water to the rural community especially in the saline prone areas. A system can be customized with pump and the filtration system for removing arsenic, salinity and other impurities from water. Government has already installed 116 solar based drinking water systems in coastal areas through SED project. This RE technology can be a possible way of solving the problem of safe water scarcity in other coastal area and northern part of Bangladesh. Besides the above, the following technologies of solar energy are significant for future possibility and promotion:

#### **4.1.9 Floating Solar Projects**

Floating solar power plant is an innovative approach of using photovoltaic modules on water infrastructures to conserve the land along with increase in efficiency of the module. Additionally, the water is also conserved due to reduction in evaporation of water from the water body. The plant can be installed on a pond, lake, reservoir, or on any other water body. Huge solar energy can be harnessed through floating PV plant technology for sustainable energy production.

Country's first floating solar power plant of 10-kilowatt capacity has been commissioned at Mongla under Bagerhat district recently. The innovative aspect of the project offers promising prospects for expanding the floating technology in the country.

#### **4.1.10 PV Pumping or Pumped Hydro Storage Projects**

Photovoltaic water pumping systems convert solar energy into electrical energy to power the water pump. Water pump makes it possible to store water to a reservoir from a source (river, basin, well etc.) even if no energy source is present on the site. This system allows access to water in the most remote areas in providing drinking water, irrigation or other purpose. Photovoltaic water pumping systems can also be used for mini-hydro plan for electricity generation. At day time, water can be pumped up to the reservoir and in the evening time the reserved water can be used as a potential for mini-hydro plant for electricity generation for a particular locality.

Around Chittagong hilly areas, at the base of hill, reservoir with small capacity can be constructed to harness a remarkable amount of renewable energy. The local Government may encourage for the development of Solar Pumped Hydro Storage Projects.

#### **4.1.11 Base Transceiver Station (BTS) Charging Station**

Nationwide Optical Fiber Telecommunication Transmission Network operators, VoIP Operators, Call centers, Rural Internet service centers by cellular operators etc. all having thousands of BTS/Transmission hubs and serving in remote rural villages/towns, which providing modern telecommunication infrastructures. Deployment of base stations in such areas often throws up 'power' challenges as these areas are either not covered by the utility grid or existing power supply is intermittent and unreliable. Telecom companies here have conventionally relied upon diesel fired generator as a backup power to their microwave repeater stations, mobile base stations, VSATs & gateways, and rural telephony. Rising costs of diesel and regular maintenance of diesel generator sets in remote areas increases

the operational overheads incurred by the telecom. Hence, the option of augmenting diesel generator sets with solar PV systems may be good option for using environment friendly clean energy. Some telecom operators are successfully operating solar-powered base station in remote area. Learning from its performance evaluation, the solar PV powered BTS could become a successful technology in harnessing renewable energy in Bangladesh.

#### 4.1.12 Solar Thermal Power/Concentrating Solar Power (CSP):

The technology involves harnessing solar radiation for generation of electricity through a number of steps finally generating mechanical energy to run a generator. This technology needs to be disseminated in the country to supplement the power supply. Solar water heating needed to be introduced in hotel, restaurant, hospital, and industrial use.

#### 4.1.13 Solar Energy Potential

According to estimates, Bangladesh receives considerable amounts of solar radiation with 1,900 kWh/m<sup>2</sup> per year. Daily, this figure translates to 4 to 6.5 kWh/m<sup>2</sup>. Recently, the government issued a National Solar Energy Roadmap (SREDA) draft. It recommends a new solar target to address the sluggish clean energy progress. The aim is to have up to 40 GW by 2041, with 40% coming from rooftop solar. If the government prioritizes the accelerated action plan, by 2041, Bangladesh could see a solar power potential making up 50% of its installed capacity.

Additionally, with an estimated 1,500 km<sup>2</sup> of ponds, Bangladesh has a significant potential for floating solar. According to estimates, even utilizing only one-third of the ponds for solar installations can generate 15 GW. Furthermore, Bangladesh also has 2,500 km<sup>2</sup> of shallow water areas. Installing floating solar on just 10% of these areas would generate 25 GW. Big lakes like the Kaptai and the thousands of kilometers long river pockets could add 20 GW.

Regarding land-based options, it is calculated that Bangladesh has around 5,000 km<sup>2</sup> of potential for roof systems. Fulfilling just 10% of this could generate 25 GW. (Source: energy TRACKER ASIA, 12 May 2022).

- SREDA shall commence solar mapping by engaging professionals and workout the best technology in respect of efficient PV & price on the basis of annual average irradiance available.

## 4.2 WIND ENERGY

**Wind energy** is known for its eco-accommodating nature and considered as the best sustainable power source that outfits for future energy solutions. Recent development of wind turbines for wind power from low velocity wind hopes that wind could also be suitable renewable resources of RE in Bangladesh. Mainly two types of technology in respect of location, namely Onshore wind and Offshore wind, are being in practice worldwide.

- a. **Onshore wind Energy:** It is the energy that's generated by wind turbines located onshore (inland, including lakes and other bodies of water located inland) driven by the natural movement of the air. Onshore wind farms usually constructed in fields or coastal area of less-populated areas where buildings and obstacles don't interrupt the air.
- b. **Offshore wind Energy:** To harness Offshore wind energy, wind farms are constructed in large bodies of water, usually in the sea. These installations can utilize the more frequent and powerful winds that are available in these locations and have less visual impact on the landscape than land-based projects. However, the construction and maintenance costs are considerably higher. As of 2020, the total worldwide offshore wind power capacity was 35.3 GW.

Bangladesh is to do the breakthrough in wind power technology to be competitive against other conventional commercial energy sources. Some projects are already in process.

#### 4.2.1 Solar Wind Hybrid

Hybrid Power Plant is an integrated hybrid energy solution of harnessing both the sunlight on-site and wind energy. The system integrates solar and wind energy systems to capture complementary solar and wind resources. Hybrid Power Plant system is based on a modular, scalable, distributed renewable energy system designed and optimized for On and Off-grid installations.

The Hybrid Power Plant generators are controlled by the system onboard electronics. There is the mechanical break system to protect the system from extreme weather conditions. Hybrid Power Plant allows customers access to use clean and renewable energy sources for all their energy needs with reduced energy costs and lowering the overall environmental impact. An assessment the techno-economic viability of this technology is needed.

#### 4.2.2 Wind Potential

U.S. National Renewable Energy Laboratory studied the wind potential in Bangladesh. The U.S. National Renewable Energy Laboratory (NREL) concluded that Bangladesh has significantly more wind power potential than previously thought, especially at a hub height of 140 to 160 meters. The areas with the highest potentials reaching 724 km, like the coastline along the Bay of Bengal, Kuakata, Sandwip, and St. Martin. Wind power installation in these areas would solve a lack of energy access for locals who have remained off the grid. Furthermore, according to the National Renewable Energy Laboratory (NREL), there is over 20,000 km<sup>2</sup> of land where wind speeds range between 5.75 and 7.75 m/s. This equals to a potential of over 30,000 MW.

- Proper wind mapping shall be conducted by SREDA for identifying the potential locations for power generation. On the basis of the wind data, detailed engineering analysis as regards design of the wind turbine in respect of unit generation capacity, hub height would be established and the sponsors should be accordingly contracted.

### 4.3 BIOMASS ENERGY

The natural substance originating from living or dead life forms like the plant, yields, tree and its deposits are considered as biomass. Biomass is contemplated as an outstanding, reliable and sustainable energy source. Biomass absorbs CO<sub>2</sub> for photosynthesis within the sight of sun-based energy to deliver natural mixes required for its development. However, it is well documented that biomass discharges CO<sub>2</sub>. Hence, even though biomass is a sustainable energy source, it is not relatively so clean for the environment. Notwithstanding, on the planet, approximately 2.6 billion individuals rely upon biomass for purposes, such as heating or cooking.

#### 4.3.1 Biomass

Being a primarily agricultural country, has an enormous volume of biomass assets that incorporates rice shell, animal waste, crop sediment, timber, municipal waste, jute stock, sugarcane residue and additional complementary springs because of the country's rainforest, the ecological and biological system. In Bangladesh, practically 64% of all-out lands are utilized for agricultural reasons. Along these lines, the nation has a huge extent of agricultural deposits from different harvests, including sugarcane, rice, vegetables, jute, wheat, beets, maize, coconut, cotton groundnut and millet developed all the year round. As a result, practically 70% of individuals, immediately or discursively, depend on biomass energy in Bangladesh.

The biomass potential assessment carried out **under UNDP assisted SREPGen project concluded with the following findings:**

- (a) Total tree biomass stock of the country in 2015 has been estimated as 520.99 million ton, of which the above ground and below ground biomass stocks were estimated as 434.16 million tonnes and 86.83 million tonnes respectively.

- (b) It has been estimated that the total village biomass production from all 64 districts would be 260.48 million ton.
- (d) Total extraction of tree residues from village forest and government forests in 2015 has been estimated as 16.19 million ton; and their projected supply in 2050 has been estimated as 10.24 million ton.
- The above potentials of Biomass mostly used for cooking purpose in the rural area and may not be enough to produce commercial use of electricity.

#### **4.3.2 Biogas**

Biogas is created by anaerobic processing that can be utilized for cooking, lighting, and power production and the residue can be utilized for fertilizer, fish feed and compost. Thus, Bangladesh has a tremendous opportunity concerning biogas production from current build-ups and waste assets. It was affirmed that it was possible to utilize 2.91 billion m<sup>3</sup> biogas in Bangladesh in 2012–2013, which was equal to 1.455 billion liters of diesel. Thus it is a potential of alternate source of energy to harness. A positive mind set to be created among the people for extensive use of Biogas.

#### **4.3.3 Bio fuel**

Bio fuels can be produced from a variety of plants like rapeseed, mustard, corn, sunflower, canola algae, soybean, pulses, sugarcane, wheat, maize, and palm. The most popular option for producing bio-fuels is from non-edible oilseed bearing trees. The two most suitable species are: Jamalgota (*Jatropha curcas*) and Verenda (*Ricinus Communis*). Both of these trees can grow virtually anywhere in any soil and geo- climatic condition. Bio-fuel use is not new in Bangladesh. In the early 20th century, bio-fuel was used for lighting lamps or lanterns. In an agriculturally based country like Bangladesh, bio-fuel can be a better alternative because a 30 percent blend of bio-fuel can be used along with our diesel or petrol. The use of bio-fuel is increasing in most European countries. The potential of Bio-fuel yet to be assessed.

### **4.4 WASTE TO ELECTRICAL ENERGY**

Major Cities have been suffering for a long time from a tremendous environmental pollution caused by municipal solid waste, medical waste and various industrial wastes. In order to save the city from environmental pollution the waste management as well as electricity generation from the solid wastes program is being taken by the Government.

### **4.5 HYDRO ENERGY**

Hydroelectric power, also called Hydropower, electricity produced from generators driven by turbines that convert the potential energy of falling or fast-flowing water into mechanical energy. Usually hydropower plants as facilities that have a capacity of more than 30 megawatts (MW) is termed as Large Hydropower, Plants that generate between 100 kilowatts and 10 MW are termed as Small Hydropower plants and Plants having capacity of up to 100 kilowatts are termed Micro Hydropower plants. There is one Large Hydro power plant at Kaptai established in the 1960s with present installed capacity of 230 MW. Small and Micro hydro have limited potential in Bangladesh, with the exception of Chittagong and the Chittagong Hill tracts. Hydropower assessments have identified some possible sites from 10 kW to 5 MW but no appreciable capacity has yet been installed.

Other than those potential there are some potential for Pumped Storage Power Plants (PSPP) was indicated in PSMP 2016. Out of which 17 was selected as the most preferable potential site for the first PSPP project in Bangladesh, and 13 was evaluated as the second potential site for PSPP. But no plan is available to implement those.



## **4.6 OTHER RENEWABLE ENERGY SOURCES**

Other renewable energy sources include geothermal, tidal energy, river current, Wave energy and Potentialities of these sources are yet to be explored.

### **4.6.1 Geothermal Energy**

Traditional geothermal energy exploits naturally occurring high temperatures, located relatively close to the Earth's surface in some areas, to generate electric power and for direct uses such as heating and cooking. Geothermal areas are generally located near tectonic plate boundaries, where there are earthquakes and volcanoes. Geothermal provided an estimated 225 TWh globally in 2020. Like biopower and unlike intermittent wind and solar power, geothermal electricity can be used continuously. No assessment of Geothermal energy is available right now.

### **4.6.2 Tidal Energy**

The tides at Chittagong, south east of Bangladesh is predominantly semidiurnal with a large variation in range corresponding to the seasons, the maximum occurring during the south-west monsoon. A strong diurnal influence on the tides results in the day time tides being smaller than the night time.

In the year 1984, an attempt was made from the EEE department of BUET, Dhaka to access the possibility of tidal energy in the coastal region of Bangladesh, especially at Cox's Bazar and at the islands of Maheshkhali and Kutubdia. The average tidal range was found to be within 4-5 meter and the amplitude of the spring tide exceeds even 6 meter. From different calculation it is anticipated that there are a number of suitable sites at Cox's Bazar, Maheshkhali, Kutubdia and other places. Tidal energy might be a good alternative source for Islands. Appropriate R&D activities are required to harness the Tidal energy in useable form with possibility to supply in the main grid in the future.

### **4.6.3 Wave (Ocean) Energy**

Until to now no attempt has been made by Government of Bangladesh to assess the prospects for harnessing energy from sea waves in the Bay of Bengal. Wave power could be a significant alternative source of energy in Bangladesh with favorable wave conditions especially during the period beginning from late March to early October. Waves are generally prominent and show a distinct relation with the wind. Waves generated in the Bay of Bengal and a result of the south-western wind is significant. Wave heights have been recorded by a wave rider buoy and correlated with wind data. Maximum wave heights of over 2 m, with an absolute maximum of 2.4 m, on the 29 July were recorded. The wave period varies between 3 to 4 sec for waves of about 0.5 m, and about 6 sec. for waves of 2 m. No assessment for potential of wave energy is found in the country.

### **4.6.4 River Current**

A network of rivers, canals, streams etc. numbering about 230 with a total length of 24140 km covers the whole of Bangladesh flowing down to the Bay of Bengal. Different sizes of boats are the main carriers of people and goods for one place to another. Boatmen usually use the water-sails to run their boats against the wind direction. But until now no research has been reported to utilize the energy of river current properly.

### **4.6.5 Hydrogen energy**

Hydrogen energy involves the use of hydrogen and/or hydrogen-containing compounds to generate energy to be supplied to all practical uses needed with high energy efficiency, overwhelming environmental and social benefits, as well as economic competitiveness. The world is presently experimenting the dawning of hydrogen energy in all sectors that includes energy production, storage, and distribution; electricity, heat, and cooling for buildings and

households; the industry; transportation; and the fabrication of feedstock. Energy efficiency and sustainability are two important factors driving the transition from the present fossil fuel-based economy to a circular economy, that is, a renewable circular sustainable fuel utilization cycle that will characterize the highly efficient engineering and the energy technological choices of the 21st century.

Hydrogen energy end use technologies are not yet mature, unlike conventional technologies. However, they offer potentially significant advantages in terms of low or zero emissions and flexibility in fuel sources. As immature technologies, costs are high and reliability and durability are not yet proven. Nevertheless, early demonstrations of hydrogen vehicles using internal combustion engines and fuel cells are under way and expected to become more widespread. Similarly, hydrogen energy systems for power and heat production are operating under demonstration conditions in many areas. The possible integration of hydrogen energy storage with renewable energy sources offers the prospect of economically efficient remote power systems and reductions in the external costs of energy associated with many fossil fuels. Over the long term, hydrogen energy is likely to be used in many everyday situations, and hydrogen energy technologies will replace many conventional technologies. The economics of such hydrogen technologies will improve as they enter widespread use, and the added value of low pollution should further enhance the value of such systems.

## 5 REGIONAL TRADING OF CLEAN /RENEWABLE ENERGY

The cross border cooperation on renewable energy, where two or more countries can develop a joint RES project or support mechanism have been emphasized in PSMP. It might contribute to a more dynamic, efficient and integrated internal energy market by providing a level playing field among Member States and promoting the harmonization of national legislative and policy approaches. At the same time, it could promote the more effective achievement of Energy Union targets, while increasing the security and resilience of the energy system.

With a growing energy demand and increasing emphasis on sustainable energy, enhanced regional cooperation is critical to boost energy security and overall climate-resilience in South Asia. Cross-border cooperation and interconnected power grids can lower energy costs, improve reliability, and reduce carbon emissions at lower-cost, while increasing the share of and synergies among clean energy resources, particularly hydro, wind and solar.

South Asia has more than a quarter of the world's off-the-grid population — roughly 255 million people (2016). The economic costs of power distortions is estimated at 4-7 % of the region's GDP. Even as South Asia is improving access to electricity, demand for power is expected to double in this decade. The South Asia Roadmap for the World Bank's Climate Change Action Plan (2021-25) emphasizes regional cooperation to decarbonize energy production, and regional markets to optimize power resources and scale the role of renewable energy in cleaner energy trade. These efforts dovetail with the recent Green Grids Initiative-One Sun One World One Grid launched on the sidelines of the COP26, to connect energy grids across borders and facilitate a faster transition to renewable energy use.

As Bangladesh has limited RE resources and land limitations, Cross border connectivity with reasonable RE trade on win-win basis will enrich development of RE in the country.

## 6 INSTITUTIONAL FRAMEWORKS

- 6.1 Power Division of the Ministry of Power, Energy and Mineral Resources (MPEMR) has the overall responsibility for formulation and execution of Government policies in the power sector coordinating with relevant government agencies/authority/utility in achieving national policy objectives.
- 6.2 In case of Renewable Energy, Sustainable and Renewable Energy Development Agency (SREDA) has been established under the SREDA, Act 2012, as a focal point for sustainable energy comprising renewable energy & energy efficiency, development and promotion. SREDA is responsible for all the function within the provision of the SREDA Act. SREDA Board comprises of representatives of stakeholders including business community,

academics, representative from Bangladesh Solar Energy Society, NGOs, financial institutions and implementing agencies. Power Division of the MPEMR is responsible for overall policy formulation, execution and development functions of renewable energy through SREDA.

- 6.3 Bangladesh Energy Regulatory Authority (BERC) set up under the "BERC Act" is the apex regulatory body, which is mandated to act as an independent regulator for the provision of electric power services in Bangladesh. Regulatory functions like license, tariff, dispute settlement etc. lies with BERC.
- 6.4 Bangladesh Power Development Board (BPDB), Bangladesh Rural Electrification Board (BREB), Dhaka Power Distribution Company (DPDC), Dhaka Electricity Supply Company (DESCo), West Zone Power Distribution Company (WZPDCo), Northern Electricity Supply Company (NESCo) provide electricity distribution services to multiple customers under license from BERC.
- 6.5 Power Grid Company of Bangladesh (PGCB) is the sole public sector transmission system operator in the country, licensed by BERC, transmits power purchased through the BPDB or any other legislative regime specified by GOB time to time. PGCB is also the System Operator for the secure, safe and reliable operation, control and dispatch of generation facilities as well as the Transmission Network Operator for the operation and maintenance, planning, design and expansion of the national transmission network.
- 6.6 Power Generation Authority/ Companies such BPDB, Rural Power Company Ltd. (RPCL), Electricity Generation Company Limited (EGCB), Ashugonj Power Station Company (APSC), B-R Power gen, North West Power Generation Company Ltd. (NWPGL), Coal Power Generation Company etc. and independent power producers (IPPs).
- 6.7 Infrastructure Development Company Limited (IDCOL) was established on 14 May 1997 by the Government of Bangladesh with the vision to catalyze and optimize private sector participation in promotion, development, and financing of infrastructure as well as renewable energy, and energy efficient projects in a sustainable manner through public-private-partnership initiatives. It was licensed by the Bangladesh Bank as a non-bank financial institution (NBFI) on 5 January 1998 and since its inception, IDCOL is playing a major role in bridging the financing gap for developing medium to large-scale infrastructure and renewable energy projects in Bangladesh. In addition, IDCOL provides support for feasibility analysis, training and capacity building as well as for promotion and awareness campaign.
- 6.8 Power and Energy Research council under MPEMR is also a part of institutional framework in respect of R&D activities.
- 6.9 BPMI may be integral part of this policy with the responsibility of skilled human resources development.
- 6.10 This Policy will continue to support new technologies such as off-shore wind energy, tidal and wave energy, bio-fuel, hydrogen, Concentrated Solar Power and other markets on case-to-case basis to evaluate the potential & techno-economic viability. The Government shall endeavor Research and Development activities on new technologies for advancement of RE in the country. In view of the above, Renewable Energy Development Fund can be developed and that can be utilized as per the plan approved by the GoB Level Steering Committee. This development fund can be raised like Power and Energy development fund under BERC. This fund can play a vital role for financing the R&D and human resources development activities of Renewable Energy.

## **7 PROGRAM & PROJECT DEVELOPMENT**

### **7.1 General Policy measures & Supporting Arrangements**

- 7.1.1 SREDA in conjunction with the Power Division of MPEMR shall be responsible for determining the priorities for renewable energy technology development and program implementation.
- 7.1.1 SREDA shall develop RE Master Plan within a time frame after the adoption of the Policy. The RE Master Plan shall include resource analysis, potential project sites, Grid integration scope, and time bound capacity

addition of different Renewable Energy Technologies (RETs) including the development of transmission facility with resolving the Grid stability issues. RE Master Plan shall be the integral part of PSMP and PSMP shall have to be revised in consideration with RE Master Plan.

- 7.1.2 SREDA shall support capacity building, technology development, and market development sufficient to boost the share of electricity generated from renewable energy technologies.
- 7.1.3 SREDA will provide one window institutional support for all RE projects other than IPPs. In case of IPPs, the RE wing of the Power Division will provide one window institutional support.
- 7.1.4 SREDA shall be the focal point for rendering One-Stop service for different permits need to collect from different department for the development of a project.
- 7.1.5 All power utilities and other government departments, private agencies and NGOs are to develop renewable energy development program for implementation throughout the country.
- 7.1.6 Electricity generated from renewable energy projects, both in public and private sectors may be purchased by power utilities or any consumer through mutual agreement (less than 5 MW).
- 7.1.7 Government will facilitate the Cross Border Trading of Renewable and Clean Energy with the neighboring countries.
- 7.1.8 SREDA will encourage human resource development and local production of renewable energy equipment, facilitate and monitor quality of renewable energy equipment, and will assist to setup quality control laboratory to test the renewable energy equipment.
- 7.1.9 RPO & REC will be set as regulatory obligation to the Generation companies, Distribution utilities and Consumers. SREDA will work out to develop a mechanism of introducing and will be imposed with regulatory order from BERC.
- 7.1.10 Building code/ green building policy to be introduced.

## **7.2 Promotion of MW Scale Renewable Energy project/ Park**

- 7.2.1 This Policy aims to promote development of RE Projects/Parks with or without storage in the country which includes solar parks and/or wind parks and/or hybrid parks (i.e. Solar-Wind or any other renewables).
- 7.2.2 In general, The Government shall select the private developer through transparent competitive bidding, for developing the project as IPP model. In this case, Power Division of GOB shall routinely announce new capacity requirements, after confirming the purchase and the interconnection commitments from the relevant entities. A tender may be based either on a single technology (ie solar, wind etc) or following multiple technology procurement with one or more identified interconnection point(s) and a required date for completion.
- 7.2.3 In certain cases, the GOB may find it strategically important to execute projects under Government to Government (G2G) frameworks. Such commitments will result after negotiations with other government, under such framework agreements, where such procurement will be commercially viable based on the national priorities and in accordance with the laws of Bangladesh
- 7.2.4 The unsolicited projects shall be entertained only for new technologies, or where proprietary right exist for the sponsor, and shall require feasibility study and shall be allowed after negotiation of tariff and proper approval of the GoB.
- 7.2.5 Apart from the above, the private park developers are free to setup the parks for development of RE projects under open access route (captive/group captive/ third party sale) for sale of energy within the country. In case of development of Renewable Energy Parks by Private developer for open access projects, the GoB shall facilitate the park allocation through application process.

**7.3 Projects for Residential/Commercial/Industrial Consumer**

- 7.3.1 Renewable Energy Projects (Solar/wind) can be set up by any consumer (residential/commercial/industrial/others) on their rooftop /premises irrespective of consumer sanctioned load.
- 7.3.2 Renewable Energy projects can also be set up by a developer on the rooftop / premises of a consumer (residential/ commercial/ industrial/others) for generation and sale of power to such consumer in the same premises (Third party sale) for which developer and consumer shall enter into a lease agreement and /or power sale agreement.
- 7.3.3 Surplus energy generated from the project after set off on billing cycle basis shall be purchased by respective distribution utilities at a rate set by BERC.
- 7.3.4 Excess drawl by consumers from the grid, if any,

**7.3 Promotion of Grid connected Rooftop Solar PV Projects**

- 7.3.1 Implementation of grid connected rooftop solar PV projects shall be administered by respective Distribution Utilities (including registration, approval, metering protocols, safety protocols, and standards).
- 7.3.2 Rooftop Solar PV Projects can be set up by any consumer (residential/commercial/industrial/others) on their rooftop /premises irrespective of consumer sanctioned load. (In this case net metering policy may be revised)
- 7.3.3 Renewable Energy projects can also be set up by a developer on the rooftop / premises of a consumer (residential/ commercial/ industrial/others) for generation and sale of power to such consumer in the same premises (Third party sale) for which developer and consumer shall enter into a lease agreement and /or power sale agreement.
- 7.3.4 The project developer shall obtain the safety approval from the Office of the Chief Electrical Inspectorate for rooftop solar PV projects.
- 7.3.5 The Government of will support implementation of Rooftop Solar PV projects as per the prevailing Net Metering Policy any other forthcoming programs taken by GoB.
- 7.3.6 Incentives in terms of custom duty on specified items and others shall be extended to the project developer under this Policy.
- 7.3.7 The Government shall also promote grid connected rooftop solar PV projects on public buildings, domestic buildings, commercial and industrial establishments and others through gross metering arrangements. This option also needed to be added to the Net Metering guide line.
- 7.3.8 The Government will promote Peer-to-Peer (P2P) trading of Rooftop Solar PV energy between two or more grid-connected parties. The implementation of P2P model shall be as per the guidelines of SREDA and Regulatory order BERC.

**7.4 Off-Grid Rooftop Solar PV System without net metering**

- 7.4.1 Solar projects installed on the consumers' rooftops for their captive use isolated from the grid with or without energy storage system shall be treated as standalone and off-grid projects.
- 7.4.2 The Government will promote off-grid rooftop Solar PV Plant with the provision of this Policy subject to safety approval from the Office of the Chief Electrical Inspector.
- 7.4.3 The project developer shall adhere to the safety codes and standards for safe operation of the off-grid system.

## **7.5 Promotion of Solar Irrigation**

- 7.5.1 The Government will promote Solarization of existing grid connected Irrigation pumps or Diesel pumps as per Guide lines of Solar Irrigation Pump.
- 7.5.2 After adoption of this policy, no new approval for electricity connection will be given for any irrigation pump unless it is a Solar Irrigation Pump under the provision of Guide lines of Solar Irrigation Pump.
- 7.5.3 Preference will be given for using surface water by Solar Irrigation pump.

## **7.6 Promotion of Solar Energy for Charging the Electric Vehicles and Battery Swapping Stations**

- 7.6.1 The Government will promote use of RE for charging the electric vehicles and battery swapping stations with the aim of greening the transportation sector.
- 7.6.2 The charging station/Battery swapping station service providers may set up RE generation plants within their premises as Private Charging Infrastructure/Stations or Public Charging Infrastructure/ Station under Electric Vehicle Charging Guideline.
- 7.6.3 Ground mount and Rooftop Solar PV Plants can be used for supplying the power to the EV Charging stations/Battery swapping stations.
- 7.6.4 RE for charging the EVs/Battery swapping stations can be with or without energy storage.

## **7.7 Promotion of Floating Solar Projects**

- 7.7.1 The Government will promote development of floating solar on existing reservoirs/dams of hydro stations or any other water bodies including reservoirs and lakes.
- 7.7.2 The Government will allocate the water body on long term lease/rental basis for development of projects for sale of energy to utilities or Urban Local Bodies by utilization of the lake water bodies.
- 7.7.3 The project developer is free to make connectivity with grid subject to the consent from concerned utility/PGCB, Water Resource Department and other Authority (as applicable).
- 7.7.4 Floating Solar Projects can be developed with or without energy storage system.
- 7.7.5 The guidelines for implementation of floating solar projects will be notified by SREDA.

## **7.8 Other Technologies of using Solar Energy**

- 7.7.1 The Government will promote development of Other Technologies of using Solar Energy, such as Solar Street light, Solar drinking water system, Solar water heating, BTS charging station by Solar PV or other if any and new technology identifies as RE, within scope of this policy.

## **7.9 Promotion of Wind Energy**

- 7.9.1 Wind Energy projects like Offshore Wind Park or Onshore Wind Park or Solar-wind hybrid Projects with or without energy storage system can also developed according to the clause 6.2 of this policy.

## **7.10 Promotion of Biomass Projects**

- 7.10.1 Biomass being major sources of energy in rural area, a comprehensive plan for the development of Biomass energy shall be developed by SREDA based on Biomass resource mapping. A separate wing in SREDA may be established for facilitating biomass energy development.
- 7.10.2 The GOB will promote generation of energy through Biomass to enable development of Bio-energy based projects in the country.

- 7.10.3 Procurement of energy from biomass projects shall be based on the tariff discovered through competitive bidding process as per the requirement of the utility subject to the approval of the BERC.
- 7.10.4 Developer of biomass project is allowed to use the power for captive/group captive or third-party sale within country.
- 7.10.5 Biogas plant for cooking or bottling or bagging maintaining standard quality may a good approach.
- 7.10.6 Bio-slurry and floating toilet may be good source of biogas.
- 7.10.7 For large biomass electricity projects (i.e. greater than 1 MW) the project developer must demonstrate that the biomass is being sustainably harvested and that no adverse social impact will result from that development.
- 7.10.8 Production and use of bio-fuels may be encouraged without jeopardizing the existing crops.
- 7.10.7 For promoting biomass projects a guideline will be notified by SREDA.

### **7.11 Promotion of Waste to Energy Projects**

- 7.11.1 The GOB will promote generation of energy from wastes to enable development of waste-to-energy projects in the Country.
- 7.11.2 Procurement of energy from Waste-to-Energy Projects by Utility shall be as per the tariff determined by the BERC.
- 7.11.3 Developer of waste-to-energy projects is allowed to use the power for captive/group captive/slaughter house or third party sale within the country.

### **7.12 Energy Storage Projects for Renewable Energy**

The government will facilitate the development of energy storage market including pumped hydro in the country with the objective of integrating more RE in to the grid which can offer grid services such as grid optimization, peak reduction, curtailment management, contribution to reliability needs, managing intraday variation and seasonal variations and others, and also to meet the increasing power demand of the country through RE within the provisions of this Policy. Use of energy storage systems by residential, commercial or industrial consumers, in conjunction with renewable energy has potential to improve power quality and reliability for such consumers.

Supports for Energy Storage Projects:

- 7.12.1 Energy storage service providers can tie-up with RE developers or can utilize any energy sources (i.e. energy exchange etc.) for storing the energy and the stored energy can be sold to Power purchaser (BPDB as Single buyer) or Open Access consumers within the country .
- 7.12.2 Energy storage projects can be either co-located with RE projects (i.e., energy source) or it can be located near the load centers (i.e., sub-station and/or consumers).
- 7.12.3 Existing and new RE projects can use energy storage system to manage variations in generation and offer necessary grid support services/ancillary services to Transmission /Distribution utilities as per their requirements. In the case of existing projects, the use of energy storage system to offer grid support services/ancillary services shall be subject to the consent from the concerned Transmission/Distribution utility and approval of PPA by the Power Division.
- 7.12.4 RE projects (existing and new) developed under captive/group captive and third party sale may use energy storage system to store the excess generation and set off appropriately. The guidelines for use of energy storage system in RE captive/group captive and third party sale projects will be issued by SREDA with the approval of Power Division.

- 7.12.5 For the purpose of optimal utilization of existing transmission capacity within the country, locations such as retiring thermal power stations and existing Renewable Energy Parks will be evaluated for developing energy storage projects.
- 7.12.6 The Government will also encourage development of Pumped Hydro Storage Projects within the country including private investments.
- 7.12.7 It is needed to explore the way/study for RE sources expansion plan and battery emulation to inform energy storage placement, sizing, and technology.
- 7.12.8 Strengthening ancillary services and sufficient spinning reserve to ensure system stability in the RE penetration in the grid is needed to be initiated.

### **7.13 Other RE Sources**

- 7.3.1 Other RE sources such as Solar Thermal, Geothermal, Mini and small Hydro, Tidal, Wave, River current, Hydrogen etc. are not in practice or even no assessment has been carried out yet in the country. GoB will take initiatives for potential assessment and R&D activities of these RE sources observing the global trend and development.

### **7.14 Innovation/Pilot Projects/R&D**

- 7.14.1 The Government will promote adoption of new and emerging technologies in the Country. Power Division will support new initiatives/pilot projects including Floating Solar, off-shore wind energy projects, geothermal energy, tidal and wave energy, hydrogen and fuel cells, Bio-fuel, CSP and other emerging energy technologies.
- 7.14.2 For promotion of offshore wind energy projects, the Government may take project for offshore wind mapping in the coastal region with the help of development partner.
- 7.14.3 Initiatives from the private sector in Research and Development (R&D) activities for advancement of RE to be encouraged by GOB.
- 7.14.4 To encourage solar thermal market, solar steam generating systems at institutions and industries shall be encouraged. Solar water pumps, water purification systems, solar application to cottage industries shall be priority areas. To conserve electricity in peak hours, solar water heaters, solar lighting systems, solar hoardings etc., shall be encouraged in domestic, commercial and industrial applications.
- 7.14.5 The Government shall endeavor Research and Development activities for advancement of RE in the country. The proposed Renewable Energy Development Fund may be one of the sources for funding the activities.
- 7.14.5 SREDA will be the nodal agency for promotion of new initiatives/pilot projects in the Country.

## **8 ALLOTMENT OF PROJECTS**

- 8.1 The Power Division in favor of Bangladesh Government will facilitate the project allocation through application process and /Power Division/SREDA shall be the nodal agency for processing such applications.
- 8.2 In case Solar and Wind project of large capacity, the applicant shall furnish the details as per the standard application form along with required documents as prescribed by Power Division.
- 8.3 In case of Mini and Small Hydro, the project developer shall furnish a Pre-Feasibility Report containing the preliminary details required for the implementation of the project along with the application.
- 8.4 The developer shall identify the site/land area required for the project development. Further, the details of the land required for the proposed project shall be submitted by the project developer.



- 8.5 After receiving the proposal from the project developer, it will be reviewed and verified in respect of different requirements, in relation to the project type, by a committee and the committee will recommend for issuance of GO only when the project feasible.
- 8.6 In the case of Biomass or Waste to energy projects, the proposed technology, the fuel availability and location from where the fuel to be sourced shall be provided. The raw materials available in the surrounding areas will be taken into consideration for issuance of NOC for the Biomass power projects to avoid overlapping of other Biomass projects.
- 8.7 Applications in respect of waste to energy projects will be considered only after assurance/consent for allotment of waste from the concerned local bodies. The developer shall furnish the details of waste storage along with the initial consent from the Pollution Control Board.
- 8.8 After verifying the proposal of biomass and waste to energy projects, recommendation will be done to the Government for issuance of NOC.
- 8.9 Distribution Licensees (Utilities) shall be the nodal agency for implementation of Solar Roof top, Solar irrigation, Solar charging station, Solar street light and other small scale RE projects within their operational area.
- 8.10 A check list of project requirements needed to be available, lead time should be specified.

## **9 Land**

- 9.1 It shall be the primary responsibility of the RE project developer to acquire/lease the land required for the project development. Developer shall be permitted to set-up Solar Power Project/Wind project on private non-agriculture land without the requirement of land conversion in accordance with the provisions of GOB Act, and the rules made there under.
- 9.2 Government may also allocate land such as fallow, government khas land, char, riversides, seashores, hilly terrain etc. for RE project Development:
  - a. Government land will be allotted to RE Projects as per the provisions of GOB acts & rules as amended from time to time. RE Developer shall be allowed to sub-lease the allotted land as per the aforesaid rules. SREDA/MPEMR will recommend, on case-to-case basis, to the concerned Authority for allotment of government land.
  - b. Government land can also be identified for the development of potential hubs of medium and higher capacity solar and Wind Park, based on the studies over the country. The infrastructures for the hubs can be developed in advance by the Government/Private/reliable international financial support and allowing the use of the developed land by RE developer as leased.
- 9.3 Different organizations / departments like Bangladesh Railway, Roads & Highways, Bridge Authority, Water Development Board, BIWTA etc, also own many unutilized land or open spaces which can be effectively utilized for development of Solar Park. Government needs to impose directive order or a policy guideline so that these lands can be used for RE projects.
- 9.4 Land availability for projects is limited in Bangladesh. The government needs to consider the idea of doing a land study that identifies options for land use for utility-scale renewable energy. The study should include the benefits of using public land, identifying land that might have lower agricultural value, and understand any advantages of designating zones for renewable energy projects.
- 9.5 Bangladesh has eight EPZs and about 600 industries operate in EPZ areas. Solar PV plants can serve significant demand for these industries during daytime hours. The Bangladesh Export Processing Zones Authority (BEPZA) can produce electricity locally from solar plants of 1 MW and larger by using rooftops of factories and unused spaces in the EPZ areas and distribute electricity through their existing distribution system. Other industries outside of EPZ areas can also develop solar PV projects on rooftops and on unused

areas. As reserves of local natural gas may only last for six more years, the Bangladesh Economic Zones Authority, BEPZA, the Bangladesh Garment Manufacturers and Exporters Association, the Dhaka Chamber of Commerce & Industry and the Federation of Bangladesh Chambers of Commerce and Industries should consider this option for reliable and secure energy supply. A government guideline to generate electricity from renewable energy in Bangladesh's economic zones and EPZs is necessary.

- 9.6 Most of the non-agricultural land in Bangladesh is situated on the floodplains of rivers and in coastal areas where erosion protection is often necessary for a Solar PV developer. Approval for erosion protection measures is involved with different agencies. A streamlined process needed to create to get permission from the all agencies involved.
- 9.7 Reservation of land for RE projects in the ongoing "My village, My Town" program and in Delta Plan.

## **10. LICENSING / REGISTRATION**

- 10.1 Renewable energy project(s), to sale electricity from plants shall be required to get power generation license from BERC if the capacity of the project(s) is 5 MW or more.
- 10.2 All RE projects installed in the Country shall be required to be registered with SREDA.
- 10.3 The RE Project Developer will submit an online application for registration to SREDA in the prescribed format along with requisite documents.
- 10.4 The RE Projects installed prior to the date of commencement of this Policy, shall be also be registered under this Policy.
- 10.5 No prior registration with SREDA will be required for participation in bidding as per Private Power Generation Policy.
- 10.6 Only successful bidders will be required to register their projects with SREDA.
- 10.7 No registration will be required for solar power projects connected to low tension grid under Net Metering System.
- 10.8 Developer/power producer can transfer its registered capacity or part thereof to its 'holding', 'subsidiary', 'fellow subsidiary' or 'ultimate holding' company with the prior approval of Power Division/SREDA.

## **11.0 INVESTMENT AND FISCAL FACILITIES**

### **11.1 Investment Facilitations**

- 11.1.1 Existing renewable energy financing facility shall be expanded that is capable of accessing public, private, donor, Carbon Emission Trading (CDM) and carbon funds and providing financing for renewable energy investments.
- 11.1.2 In addition to commercial lending, a network of micro-credit support has been established especially in rural and remote areas to provide financial support for purchases of renewable energy equipment.
- 11.1.3 Power Division of MPEMR will facilitate investment in renewable energy and energy efficiency projects. Green Energy Branding may be introduced. Parties may raise local and foreign finance in accordance with applicable regulations. In general Government approval is required for approval of foreign finance.
- 11.1.4 Private sector participation including joint venture initiatives in renewable energy development will be encouraged and promoted. Power Division of MPEMR/SEDA may assist in locating the project(s) and also assist in acquiring land for renewable energy project(s).
- 11.1.5 SREDA will develop a mechanism for providing subsidies to utilities for installation of solar, wind, biomass or any other renewable/clean energy projects.
- 11.1.6 Government provision for extending soft loan could be organized to prospective sponsors for implementing Renewable Energy projects.

- 11.1.7 The RE project developer may also set up projects under the Renewable Energy Certificate mechanism in accordance with BERC (Terms and Conditions for Recognition and Issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations (to be formulated).
- 11.1.8 The renewable obligated entities are allowed to set up RE projects to fulfill their Solar and Non-Solar Renewable Purchase Obligation (RPO) requirements.
- 11.1.9 The government of Bangladesh will promote the manufacture of solar energy components including solar cell, inverters, mounting structures, batteries etc. Manufacturing plant for RE components may be allotted by government in BSCIC, EPZ, EZ etc. premises.
- 11.1.10 A suitable incentive scheme will be designed to promote co-utilization of land for solar energy projects, crop cultivation and water preservation. To promote solar energy generation in the agriculture sector incentives to the farmers may be included.
- 11.1.11 For successful implementation of renewable energy projects and initiatives lending procedure will be simplified and strengthened.

## 11.2 Fiscal Incentives

- 11.2.1 To facilitate renewable energy in total generation mix, RE components shall be exempted from import duty. As well as all renewable energy components and related raw materials in producing renewable energy equipment's will be exempted from charging VAT from the date of notification of this policy in the official gazette and it will be extended periodically upon impact assessment from time to time. SREDA with MPEMR will fix up the acceptable mechanism to reach the benefits of tax exemption to end users in consultation with NBR.
- 11.2.2 To prompt renewable energy in power sector, Renewable energy project investors both in public and private sectors shall be exempted from corporate income tax for a period of 5 years from the date of notification of this policy in the official gazette and it will be extended periodically following impact assessment of tax exemption on renewable energy.
- 11.2.3 An incentive tariff may be considered for electricity generated from renewable energy sources which may be 10% higher than the highest purchase price of electricity by the utility from private generators.
- 11.2.5 Renewable Energy Projects, developing as IPP, will be entitled to avail the Fiscal & other incentives as per Private Sector Power Generations Policy of Bangladesh.
- 11.2.4 All Renewable Energy equipment / machinery and related raw materials in producing renewable energy, not manufactured locally, will be free of Customs Duty/Vat on import. However, in order to avail the same, an undertaking shall be provided to SREDA that it shall only bring in, without customs duty, items that are to be installed in its plant, and shall not sell any such items in local market or use for any other purposes than specified.
- 11.2.5 SREDA or power division of the MPEMR will fix up the acceptable mechanism to reach the benefits of tax exemption to end users in consultation with NBR.
- 11.2.6 The electricity consumed by the Power Producer for captive use will be exempted from payment of Electricity Duty.
- 11.2.7 For RE Projects set up for Electric Vehicle (EV) charging station will be exempted transmission and wheeling charges for a period of 10 years from date of establishing of Electric Vehicle (EV) charging station. Presently a favorable tariff is applicable for EV charging station.
- 11.2.8 Suitable incentive scheme will be design to prompt solar energy generation in the agriculture sector. This may include incentives to farmer. Presently Solar Irrigation pump is provided incentives as per Guide lines

for Solar Irrigation Pumps.

- 11.2.9 Suitable incentive scheme needed to design to prompt the co-utilization of land for solar energy projects, crop cultivation and water conservation.
- 11.2.10 Waiver of stamp duty from IRD to the investor may be executed

## 12.0 Carbon Credits

Carbon Credits is mechanism for financing incentive under UNFCC. Bangladesh is signatory to Kyoto Protocol and Paris Agreement that allows accessing global carbon crediting markets, environment and climate funds and other global financing options for projects under mitigation, adaptation and a combination thereof. These financing options can be accessed by the public and private sector entities. GOB encourages the RE project developers to apply for procuring carbon credits through various carbon crediting mechanisms including Carbon Crediting Mechanism (CDM) under compliance market, financing options under voluntary markets and mitigation & adaptation actions under Government approve Mitigation Actions. GOB mandates Bangladesh Bank to facilitate, coordinate and assist the RE project developers and the Designated National Authority (SREDA) under United Nations Framework Convention under Climate Change (UNFCCC) in reconciling the most effective approach in procuring carbon credits. Bangladesh Bank may also facilitate the RE project developers in trading the carbon credits in international carbon market and help SREDA in creating national carbon credits trading scheme. The revenues generated through the sale of carbon credits will be exempted from income tax or duty.

The BB or any other Public Financing Authority will assist in the development of local capacities and creating awareness regarding various carbon crediting mechanisms available under UNFCCC.

Considering that efforts are on way to put in place new international climate treaties, GOB is committed to revising incentives for procuring benefits consistent therewith. BB or designated to effect requisite facilitation in the event of any new international regime or protocol applicable to Bangladesh.

## 13 GRID INTEGRATION

### 13.1 System Requirement in Relation to Variability of Renewable Energy

Variable Renewable Energy (VRE) projects present some technical challenges to integrate with the grids having large blocks of VRE at one location make the grid vulnerable to instability through sudden changes in frequency and/or voltage. Renewable energy sources are intermittent in nature. The technical issues those are to be taken consideration for integrating the VRE with the grid are:

- Harmonics
- Frequency and voltage fluctuation
- Power Fluctuation
- Short time power fluctuations
- Long time/Seasonal power fluctuations
- Storage
- Protection issues
- Optimal Placement of VREs
- Islanding

In order to deal with these challenges, two main approaches shall be taken in parallel.

- First, all future RET projects connecting to the grid shall be required to have certain basic equipment to support grid stability (voltage, frequency, etc.). For projects that are obtained through tenders, this will be specified in the bidding documents, while other projects will need to cover this in its proposal or feasibility

study, as applicable. On project level, single technology-based solutions may be hybridized or latest technologies may be introduced in order to support grid stability.

- The second approach is to give Transmission / Distribution Utility the task to be an integral part of the procurement process such that it can plan the grid strengthening that it needs to do to handle such variability in real time.
- Further, a study is needed to be done by international/national consultants is focusing on the improvements needed by Transmission / Distribution Utility to handle more and more VRE as well as implementation of other pre-requisite systems relevant to RE grid integration in different penetration. Stability of grid and its security is of prime importance. Since the penetration of infirm nature of RE may endanger grid security, adequate protection measures are necessary.
- In case of drawl of reactive power by RE Generators, necessary charges shall be payable at the rate prescribed by the BERC Regulation, as amended from time to time.
- The project developers shall comply with day-ahead forecasting, scheduling of wind and solar energy generators which are connected to the grid and re-scheduling them on one and half hourly basis, handling deviations of such wind and solar energy generators.
- The respective evacuation facility shall be initially approved by Transmission/Distribution Utilities depending on injection level after carrying out system studies.
- Grid integration shall be in accordance with the Grid code/Distribution code of BERC and Technical Standard of Transmission/Distribution Utilities and concerned Distribution Utility.
- Interconnection Voltages shall as follow:

Project Capacity	Interconnection Specifications
>1 KW to < 6 KW	230 V, 1 Phase, 50 Hz
>6 KW to < 100 KW	415 V, 3 Phase, 50 Hz
>100 KW to < 4 MW	11 KV, 3 Phase, 50 Hz
>4 MW	33/132/220 KV, 3 Phase, 50 Hz

## 13.2 Connectivity

- 13.2.1 Project developer is allowed to connect the RE project with National Grid or with Network of Distribution Utility as applicable for the project capacity and voltage level, subject to the evacuation feasibility.
- 13.2.2 The project developer shall conduct a feasibility study and grid impact study (set by transmission service provider) under an agreement with the Interconnecting utility or eligible third party.
- 13.2.3 The project developer shall enter into the Connectivity Agreement with PGCB/Utility (as per the Standard Format approved by BERC).
- 13.2.4 Project developer shall be responsible for connecting the generation station to the nearest grid sub-station or 33Kv/11KV Substation or distribution network as applicable and shall be radial connectivity with a dedicated transmission line, in accordance with applicable BERC/Utility Regulations and its amendments issued from time to time.
- 13.2.5 Time bound clearance for transmission evacuation approval from Transmission/Distribution Utility will be provided with receipt of requisite documents for registration. In case, network of a Distribution utility is utilized for evacuation, concerned Utility shall provide the evacuation approval with the receipt of requisite documents for registration.

- 13.2.6 For use of Transmission system by the project developer, the applicable transmission charges and losses, as determined by BERC in its tariff orders issued from time to time shall be applicable for all RE sources transmitting electricity using the network of Transmission licensee.
- 13.2.7 Enhancing the sharing power evacuation transmission/distribution Line for multiple RE developers in an area may be way of minimizing investment cost.
- 13.2.8 Wheeling, Cross Subsidy Surcharge and any other applicable open access charges shall be as determined by BERC from time to time.
- 13.2.9 Applicability of electricity duty to the RE projects developed under this Policy shall be as per the direction of Government issued from time to time.
- 13.2.10 In case of drawl of reactive power for the project, necessary charges shall be payable at the rate prescribed by the BERC.
- 13.2.11 The Developer/Power Producer shall comply with the Grid Code including Load Dispatch and System Operation Code, Metering Code, Safety Code, relevant regulations/orders of the BERC as applicable from time to time.

### **13.3 Metering**

- 13.3.1 The electricity generated by the Project shall be metered on 15-minute time block basis by BPDB/Other Dist. Utility at the receiving end at grid substation/ distribution S/S or 11 kV system of the utility. For the purpose of energy accounting, RE generating projects shall provide specified meters at the interface points. BPDB/ Dist. Utility shall stipulate specifications in this regard.
- 13.3.2 In case of consumers having contracted load / sanctioned demand not exceeding 1 MW, Dist. Utility may allow installation of meters at consumer level at consumer's cost as per the energy accounting requirement.
- 13.3.3 For Net metering, a single three phase bidirectional smart meter (capable of recording import, export and net energy consumption with recoding different parameter by 15 min. interval) shall be installed at the point of interconnection by the Utility. If by reprogramming, the existing meter can fulfill the requirements, then reprogramming is sufficient and no new meter needs to be installed.
- 13.3.4 The net meter shall conform to the specifications set by the Net-metering Guidelines, 2018 or any guidelines issued by the Government from time to time and the net meter shall finally be approved by relevant Utilities.

## **14. TARIFF STRUCTURE**

- 14.1 Corporate Renewable Power Purchase Agreements allowed corporate buyers to purchase RE from power producers (developers, independent power producer investors) at a pre-agreed (Negotiated) price for a pre-agreed period. Financial sustainability of the sector is premised on the recovery of full cost of service, to the extent feasible, through an efficient tariff structure, which ensures sufficient liquidity in the sector. The Regulator (BERC) shall align adjustments in generation-end tariff with the consumer-end tariff, which shall be submitted by the licensees and determined by the Regulator in a timely manner.
- 14.2 Tariff Design (1) The generic tariff shall be determined, on levelized basis, considering the year of commissioning of the project, for the tariff period of the project: Provided that for renewable energy projects having single part tariff with two components, fixed cost component shall be determined on levelized basis considering the year of commissioning of the project while fuel cost component shall be determined on year of operation basis in the Tariff Order to be issued by the Commission. (2) For the purpose of levelized tariff computation, discount factor equivalent to post-tax weighted average cost of capital shall be considered. (3) The above principles shall also apply for project specific tariff.
- 14.3 Both the General Tariff Structure and Tariff Design will vary case to case based on type of RE sources, Incentives provided and other factors related to the Project Implementation.
- 14.4 As BERC Act. Tariff determination is in the jurisdiction of BERC.

## 15. REGULATORY POLICY

- 15.1 The Bangladesh Regulatory Commission shall consider this Policy issues while framing its rules, regulations and orders
- 15.2 Renewable energy project(s), to sale electricity from plants shall be required to get power generation license from BERC if the capacity of the project(s) is 5 MW or more.
- 15.3 Power Division of MPEMR and SREDA, in consultation with BERC will create a regulatory framework encouraging generation of electricity from renewable energy sources.
- 15.4 Renewable purchase obligation (RPO) and Renewable Energy Certificate (REC) will be introduced to the Generation, Distribution utility and Consumer level. SREDA will formulate the mechanism or guideline for introducing RPO & REC.
- 15.5 BERC shall approve the energy tariff in consultation with Power Division of MPEMR/SREDA as per the provision of the BERC Act 2003 where applicable if the capacity of renewable energy project(s) is 5 MW or more. Electricity distributors may offer "green energy" tariffs, which provide consumers an opportunity to co-finance through their electricity bills the development of new renewable energy sources.
- 15.6 Project developer shall be responsible for connecting the generation station to the nearest grid sub-station and connect radially with a dedicated transmission line, in accordance with applicable BERC Regulations and its amendments issued from time to time.
- 15.7 The project developers shall comply with the BERC Regulations on Forecasting, Scheduling, and Deviation Settlement, as applicable and are responsible for all liabilities related Access and connectivity.
- 15.8 For interconnection with the grid and metering, the project developer shall abide by applicable Grid Code, Grid Connectivity Standards, and Regulations on Communication System for transmission of electricity and other Regulations issued by the BERC from time to time.

## 16. RESEARCH & DEVELOPMENT

Research & Development should be an integral part of an Energy Sector. Clean and Renewable energy technologies be alternatives to fossil fuel technologies require support through research and development (R&D). Learning-by-doing relates historical cost decreases to accumulation of experience. Investment for R&D lowers costs by producing

innovations that would not have occurred through learning-by-doing. In setting research policy, governments shall consider the greater benefits of cost reductions brought about by transformational rather than incremental change.

Presently R&D activities are very limited in Bangladesh. The following policy initiatives are essential for the development of RE in the country:

- 16.1 SREDA shall be the nodal agency for promotion of new initiatives /pilot projects in the country. So, SREDA shall be strengthened with R&D activities on different Renewable Energy Technology.
- 16.2 Public universities should have specific courses on RE technology with R&D activities.
- 16.3 Power and Energy Research Council, BPPI shall be equipped for conducting training and R&D activities on different RETs.
- 16.4 Government will facilitate R&D initiatives on RE components, off-shore wind energy, geothermal energy, tidal and wave energy, hydrogen Energy, Methane Energy, Bio-fuel, CSP and other emerging Renewable Energy technologies may be undertaken.
- 16.5 To encourage solar thermal market, a pilot project on CSP technology initiated by PERC
- 16.6 The Government shall endeavor Research and Development activities for advancement of RE in the country. Power Division/SREDA/PERC can take initiatives to seek fund from Development Partners in addition to GOB fund for R&D in the Power and Energy sector. The proposed Renewable Energy Development Fund may also be one of the sources for funding the activities.
- 16.7 Initiatives from the private sector in Research and Development (R&D) activities for advancement of RE may be encouraged by GOB.

## 17 AWARENESS & EDUCATION

Sustainable energy development has been related to environmental issues, which can be eradicated by replacing fossil fuels with natural resources such as hydropower, solar, and wind to generate electricity. Public awareness is important towards accomplishing the goal in implementing renewable energy. So, initiatives are required from the regulatory bodies for awareness creation of Renewable Energy. The objectives of Awareness Creation are:

- To improve knowledge and understanding of renewable energy technologies among the target audience.
- To improve public understanding of the principles and need for energy conservation and substitution.
- To create awareness and support for Government's vision of transitioning towards renewable energy in the power sector.
- To create a favorable environment for achievement of energy policy targets as well as changes in attitudes and behavior of energy consumers.

### The target audiences should be

- The general public and stakeholders
- Youth populations. Civil Society members
- Community and social media influencers
- Householders/homeowners
- Businesses including large, medium or micro enterprises
- Lending institution like Bank and other financial institutions
- Policymakers. Related Govt. officials like NBR, Custom-Vat employees etc.
- Indigenous communities
- Media



- 17.1 Renewable energy should be taught as early as the primary school level to provide initial knowledge, awareness and values to all primary students as an introduction to studies within higher institutions of learning including technical colleges and universities.
- 17.2 Renewable energy-related fields of study and curricula with research facilities are needed to be included in academic institutions.
- 17.3 The role of educators, teachers and academic institutions, such as schools, colleges and universities, in creating community awareness and providing a greater understanding of the knowledge, skills and values concerning renewable energy is highly acknowledged. In addition, they are regarded as the key agent in creating public awareness and skillness development for overcoming obstacles related to renewable energy implementation and policy.
- 17.4 Specifically, the objectives of renewable energy from the educational perspective are to: (a) create awareness among the public and students, (b) identify renewable and non-renewable sources of energy, (c) enhance motivation for creating strategies to overcome challenges and, (d) provide values and positive attitudes on renewable energy, and more important e) To develop Human resources for Renewable Energy Technology.
- 17.5 Public universities can play vital role for development human resources & Technological issues with specific courses on RE technology with R&D activities.
- 17.6 BPMI may open a separate wing for practical based training as well as for awareness creation on RE.
- 17.7 All higher educational institutions can host an annual energy and environment day to create awareness about climate change and the benefits of renewable energy as a climate change mitigation strategy. Special attention is required for human resource development in RE sector because we are lagging behind with respect to global progress of RE and human resources is one of the major cause among other causes.
- 17.8 SREDA should arrange a workshop in every financial year with participations from stakeholder to explain the investment facilities, Tax-Vat issues, Responsibilities of each stakeholder and other related issues to promote RE mix in the national energy requirement.

## 18 Environmental Issues

A significant area of concern with RE Project relates to environmental issues. However, nature and level of impacts may broadly differ depending on the location and changing physical characteristics of the project sites. The exact type and intensity of environmental impacts mostly varies depending on the specific technology used, construction and operation procedure, the geographic location, and a number of other factors. Therefore, it necessitates the environmental assessment to identify the principal requirements of the RE Projects. As a safeguard instrument, the environmental assessment (IEE/EIA) needs to be carried out individually for every projects and environmental management plan (EMP) needs to be formulated accordingly.

The RE project activities likely can be divided in to two categories sub-structural and super-structural work which comprises of Civil & Structural, Mechanical and Electrical Components. Construction work normally involves cutting of trenches, excavation, concreting, steel work, masonry work etc. Mechanical erection works involve extensive use of mechanical equipment for storage, transportation, erection and on-site fabrication work. Execution of these activities will require operation of large construction equipment like cranes, concrete mixers, hoists, welding sets etc and are associated with the environmental impacts.

Operation and maintenance of the RE projects includes regular physical checking, servicing, cleaning and replacing damaged and non-functional accessories which are also associated with environmental impacts.

Despite these adverse environmental impacts, renewable energy technologies compare extremely favorably to fossil fuels, and remain a core part of the solution to climate change. In fact, RE project provides significant environmental benefits in comparison to the conventional energy sources by reducing GHZ and CO<sub>2</sub> emission, thus contributing to the sustainable development of the country.

To address environmental issues, there are national policies, rules and regulations related to the environment are applicable for RE projects. In addition to the current policies, some additional issues could be considered as discussed below.

- 18.1 **Categorization of the RE Projects:** level of environmental assessment (IEE, EIA) depends on specific project categorization (Green, Orange-A, Orange-B & Red). Hence, inclusion of the all the RE projects in the DoE Categorization list will assist the project entrepreneur to understand the level of Environmental Assessment to be required for the specific project;
- 18.2 **Easiness' of EIA Approval and Environmental Clearance Procedure:** Conducting Environmental assessment (IEE/EIA) study and necessary approval from the Department of Environment (DoE) is mandatory and an integral part the project. IEE/EIA approval and getting environmental clearance from DoE follows structured procedure and prescribed documents. Sometimes, preparation of supporting documents and completion of necessary steps take longtime. Hence, policy maker could positively think easiness of the approval process for the renewable energy projects. Simple process will encourage public and private sector participation in the development and management of renewable energy sector.
- 18.3 **Separate Waste Management Strategy in RE Sector:** There is no specific guideline for handling, transportation and disposal of lead-acid battery and wasted PV modules and other wastes usually generated from the renewable energy projects. Formulation of separate guidelines for handling, transportation and disposal and or recycling of battery, PV panel after the warranty period are required to avoid any pollution. RE projects developers should have the proper plan for disposal of batteries for implementing a RE Storage projects.
- 18.4 **Bio-slurry Management in Bio-gas Sector:** Potentiality of generation of bio-gas from various sources is high in the Country. Hence, initiatives are required for the formulation of the specific guidelines for the management of bio-slurry.

## 19 QUALITY ASSURANCE

- 19.1 National Standards and Specifications for RE components (adopting a international standard as national standard or developing a new) shall have to be set by SREDA
- 19.2 Manual for quality assurance for Solar Panels' and RE components shall have to be developed and published by SREDA
- 19.3 SREDA shall maintain a List of laboratories where the RE components can be tested.
- 19.4 Government shall facilitate the laboratories for making equipped with the requirements for testing the RE components, locally manufactured or imported.
- 19.5 SREDA shall ensure that the laboratories are maintaining the standards and fully equipped with requirements for the testing the RE items.
- 19.6 No RE equipment's will be manufactured or to be imported unless it satisfies the National standard & Specifications and passes the testing procedure as per quality assurance manual to be developed by SREDA.
- 19.7 All utility or developer related to RE generation, Manufacturer and Importer of RE products shall have the bindings for abiding by the above policy issues.
- 19.8 The design and commissioning of RE projects shall be as per latest national standards and the project shall not cause any environmental concerns.

## 20. OPERATION & MAINTENANCE

Operating and maintenance is an integral part for smooth running of a project. Specifically, for Renewable energy Plants, Operations and maintenance, safety management systems, and other project reliability activities are critical elements impacting the efficiency to a great extent. When properly maintained and operated, wind turbines and solar panels can provide large amounts of power, cleanly and reliably, at prices competitive with any other new electricity source.

- Important maintenance strategies are measures on corrective, preventive, condition-based, opportunistic, focused-on-reliability, and production strategies, among others.
- Maintenance strategies are the "heart" of the maintenance planning and based on information obtained from the system and preprocessed the questions "When, What, Who, Where, Why, and How" are the system interventions that should be executed or not, in order to keep the system functions "alive."
- Maintenance work usually consists of checks, measurements, replacements, adjustments, and repairs to extend the useful life of the equipment and facilities to their maximum level, prevent components failure, reduce costs, and increase the service quality.
- Solar panels will need occasional maintenance after they're installed. The most common type of maintenance required for Solar panels is cleaning. Dirt and debris can collect on panels, especially during storms or extended periods without rainfall. Occasional cleaning can remove this debris and ensure that the solar panels get the optimal amount of sunlight.
- In the case of wind turbines, the maintenance plan could be improved to a certain limit in order for the system ability to resist "overloads" and external conditions changes.
- For IPP of Renewable sources, maintenance is the responsibility of the project developer.
- But for SHS, Solar irrigations, Rooftop solar system, Biogas plant etc. necessary maintenance measures are not in practice and hence installed systems are losing efficiency and finally getting obsolete long before the expected life time. This is great losing to the investor as well as for nation as all the components mostly imported with the cost of foreign currency. In addition to that, cost effectiveness are not attained as the expected life of the systems are not attained due to lack of maintenance.
- SREDA can prepare Guide lines for maintenance SHS, Solar irrigations, Rooftop solar system, Biogas plant etc. A monitoring arrangement from the Utility for the consumers within that Utility can ensure proper maintenance of the systems.

## 21. Target

### 21.1 RE targets:

Reviewing RE policy'2008, in relation to relevant existing policy documents, Acts, rules with potential RE resources and best practicing technology focused its future opportunities. Techno- economic impact, alignment of policy with national & international plan, global technological development and trends led us to illustrate upcoming RE scenario. R&D, Infrastructures & Institution, Incentives, Grid integration & sustainability issues are significant to cope with the target. Challenges and barriers can be overcome through customizing and strong willingness. Moreover, Bangladesh is the signatories of many International Climate issues agreements and Covenants. Country containing capacity, Government upholding strong commitment, undertaking action and plan will be a boost to Renewable Energy growth.

Considering all the past & progress, potentials & possibilities, capacities & commitments a RE target and roadmap may be set with the following assumptions:

Phase	Years limit	Percentage of total generation (cumulative)	Tentative MW (cumulative)
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1 <sup>st</sup> phase	Up to 2025	10%	2500
2 <sup>nd</sup> phase	2026-2030	20%	6000
3 <sup>rd</sup> phase	2031-2041	40%	20,000

**Assumption:**

1. A consistent GDP growth (6-7% average) and economic development
2. Improvement of per capita income generation
3. Foreign Direct Investment (FDI) and rapid development
4. Reduction of poverty and controlled population
5. Infrastructure development in new economic zone
6. Good governance
7. More urbanization, and "My village, My Town" concept implementation
8. EV introduction
9. Follow robust action plan with continuous surveillance.
10. Successful uplift to a middle-income country by 2041

**22. RIGHT TO INTERPRETATION**

1. Section headings are for convenience only and shall not affect interpretation of any section.
2. In case of ambiguity with regard to interpretation of any provision of these Guidelines, GOB interpretation shall be final.

**23. The Way Forward**

A strategy for implementation of the Renewable Policy will be developed which will translate the objectives and deliverables of the Policy into a practical implementation plan. It will be desirable, in constructing the implementation strategy, to clarify and coordinate the roles and responsibilities of the various agencies concerned in order to build a coherent, inclusive and stable framework for success.

The purpose of the REP is to create the conditions for the development of renewable technology for rural communities to meet their energy demand. The Government will adopt a phased, managed and partnership approach to renewable energy projects that are well conceived and show the potential to providing acceptable social, environmental and financial returns for all investors and stakeholders. This will lessen the strain on fiscal resources and hold greater potential for successful implementation.

An appropriate enabling environment towards full commercial operation will nurture the technologies that are proven to meet these Policy objectives. Progress towards meeting the targets, objectives and deliverables of the REP will be evaluated at the end of short-term project implementation, to see if these are being achieved and to determine whether the policy direction remains appropriate. The Policy may be revised as required, based on the results from monitoring and evaluation activities focusing foremost a future-friendly green Bangladesh.

## **The workshop on the interim report of revision of 'Renewable Energy Policy 2008'**

**Venue and date:** conference room of SREDA at IEB on 14<sup>th</sup> September, 2022.

**The minutes of the workshop was given bellow:**

At the beginning of the workshop, Mrs. Zakia Parvin welcomed everyone for attending the workshop. Then she introduced everyone on stage. After that, she invited Mr. Mufti Saiful Islam for reciting from the Holy Quran. He was thanked by Mrs. Zakia Parvin after his reciting. Then she welcome Dr. M.M. Amir Hossain, Md, DTCL for his opening speech.

MD sir, at first of his speech he welcomed and thanked everyone. He expressed his gratitude to SREDA for letting us to do this project. He highlighted different works of DTCL in the sector of energy and renewable energy. He also mentioned that, DTCL have experience to do work in home and abroad (16 countries). Then he focused on renewable energy, he emphasized on the maximum using of renewable energy resources. He also referring the PM's speech about the utilization of land for food security. He mentioned that, the revision of 'Renewable Energy Policy 2008' was suitable for the age. In this case, he mentioned that the using of renewable energy beside the use of LNG and LPG was very important for energy safety. At the end of his speech, he again thanked everyone for participating that workshop despite bad weather and also requested to all for participating at the discussion part of the workshop.

Mrs. Zakia again thanked MD sir for his opening speech and requested Engr. S M Zafar Sadeque, TL for his presentation. TL sir thanked everyone and presented his presentation on the interim report of 'Revision of Renewable Energy Policy 2008'.

After TL's presentation Mrs. Zakia thanked him and requested **Mohammad Golam Sarware Kainat** sir for conducting the open discussion session. The Mr. Kaynet requested all to participate in that discussion session and he started to take the questions and suggestions from the participants.

**1. Tanuja Bhattacharjee, Energy Specialist, WB-** She welcomed the activities on the upgrading of Renewable Policy and also ensured that WB will provide all types of cooperation. She informed that, the technology of RE was already practiced so the team needed to focus on the critical analysis of present RE policy. She also said that, Comparison of RE policy 2008 with the present status must need to presented to the point. She added that, if the interim report was presented more specifically then the participant could provide their opinion more specifically and fluently. She also addressed the different consultation barrier, licensing barrier and method of approval policy.

**2. Mr. Shahed Khan, Advisor, BBDF-** He requested to the team to communicate with all association for collecting the information. He mentioned that the bio mass became an important sector in RE sector in present. He figured out that, the monthly cost of a family in rural area was 10 taka in case of using of bio-gas where 1200 taka for LPG using. He also mentioned about the resources of bio-gas production technology as the byproduct of maize in Rangpur division. He added floating toilet as another source of bio-gas technology. He requested to add the bio-fuel related sources like Mehagoni, Rubber, fuel peanut etc. He addressed about the

policy related bio-gas and renewable energy which present in India. At last, he invited the team for further discussion on the bio-mass and bio-gas.

**3. Md. Haronur Rashid, DD (Power)-** He opined that our country is small and needed huge energy here. So, we needed a policy to make a platform where buyer and seller could meet together. That platform must need to except by everyone. Of course, that platform would be easy for sellers, reduced costing for seller. He also requested to address the existing policy of India about the RE. he added about the committee for the policy making procedure. He expected that the team must contact with different stakeholders and gathered the information.

After Mr. Haronur Rashid's opinion **Mohammad Golam Sarware Kainat** invited TL sir for expressing his opinion on those questions and comments.

TL sir firstly, thanked to the opinionated then expressed his explanation. He mentioned that, the resources of RE was not fully explored yet, so we need to explore more new technologies for that as per the answering of Mrs. Tanuja's information. He also specially thanked her for her commitment as a WB representative for helping to provide all information related with RE with the team later. He thanked to Mr. Shahed Khan for his informative speech about bio-mass and bio-gas. He assured him for a meeting with him and his organization later as FGD. TL again thanked and agreed with the opinion of Mr. Haronur Rashid. He assured that, he will study on India's policy related RE and also considering Mr. Haronur,s view.

**4. Mr. Abdul Hasib Chowdhury, Professor, BUET-** He figured out some points-

- It will be better to set up energy requirement clearly for reflecting the demand of RE.
- To identify the resources, uses, target and demand of RE under agriculture, industry, building etc. subsector.
- Role of RE in transportation, communication, health & sanitary, flood situation etc.
- Needed to set a target for 10, 15 & 20 years for RE
- He pointed out that zoning was a big issue of RE.
- Need to find out, how much imported fuel dependency will be reduced due to the RE policy.
- Need to communicate with the planning ministry.
- Need to address about the problems of grid distribution.
- To highlight the power system operation and distribution network point.
- Power distribution code 2012 is needed to check for VRE.
- Gap analysis and VRE control would be included in the policy according to grid code.
- He also pointed out that Light is one of the important issues in solar, so it needs to include into the policy.
- Air cooling system by using wind also need to give emphasize.

- He expected that the team need to communicate with House building institute for the information about the utilization of RE in the building.
- The policy is needed to emphasize broad spectrum instead of power generation.
- It needed to highlight about the challenges, threats and barriers about RE.

**5. Eng. Md. Motiur Rahman, Renewable head, WZPDCL-** Target of RE is needed to be enhanced.

- In the policy, challenges are needed to be addressed.
- Challenges of distribution channel is needed to be addressed.
- Needed to be addressed about the willing charge on the investment of the utility (Policy 4.5).
- Needed to be addressed about the carbon credit (Policy 5.1).
- Needed to be addressed about the VAT on the RE materials production in the policy. Incentive on the VAT. Needed to include taxation into the policy (Policy 5.2).
- Needed to be addressed about the Green Energy Tariff (Policy 6.3).

**6. Eng. Md. Nasir Uddin Miah, (XEN), DESCO-** Needed to find out the reasons why RE not become popular after passing 10 years or more.

- Needed to be highlighted about the incentive and other facilities of the investors.
- Needed to be addressed about the interest of the consumers.
- Needed to be highlighted about the interest of the utility.
- Needed to be addressed about the strong background about the tariff.
- Feasibility study will be more efficient for this project.

**7. Niaz Morshed, SO, BIFFL-** Needed to find out the sectors of RE and their viability.

- Needed to compare Captive generation and solar and find out the viability.

**8. Farhana Alam, DD (XEN, RERND), BPDB-** Policy should be short in size.

- It will be better to make a target of 2020, 2030, 2040 & 2050 years of RE in case of BD.

**9. Tazmelur Rahman, Deputy Director, KfW-** RE was not in position as their desired position, he said that. He opined that, constraints of RE, challenges of selling bio-slurry must needed to be addressed.

- Needed to addressed about the monitoring policy on the effectiveness/ workable condition of the RE.
- How the Green certification became easier and more acceptable needed to be addressed into the policy.

- Challenges of bio-mass needed to be addressed.
- Of anyone used 1000kw, he needed to produce at least 10kw energy privately, it must need to be addressed.

After Mr. Tazmelur Rahman's opinion **Mohammad Golam Sarware Kainat** invited TL sir for expressing his opinion on those questions and comments.

TL thanked Mr. Abdul Hasib Chowdhury for his informative speech and also agreed with him. He assured him to incorporate the things that Mr. Hasib figured out. TL informed him for conducting KII with him later. TL expressed his opinion that, in the reviewed RE policy challenges of RE using, Challenges of distribution channel, carbon credit, VAT, TAX etc. will be incorporated as Mr. Motiur highlighted these. TL agreed with Mr. Naasir Uddin Miah and also assured about the incorporation of interests of consumer, producer and utility in the policy. TL agreed with Mr. Niaz Morshed to incorporate about the captive generation and solar and also about the sectors of RE and their viability. TL expressed that in the policy instead of roadmap for RE as 2020, 2030, 2040 & 2050 will not viable but it would be better to incorporate RE exploration policy against Mrs. Farhana's opinion. He also appreciated her for her idea on making shorter policy. TL was thanked and agreed with Mr. Tazmelur Rahman's speech. He also assured him to discuss about bio-slurry as the source of RE later.

**10. Eng. Abdur Rashid, Director (A & F), NAPD-** It must need to be highlighted about the production of solar energy, utilization of solar energy, grid connection and profit.

**11. Md. Tanvir Masud, AD (Wind), SREDA-** He mentioned that SREDA faced so many problems specially in solar and wind section because of obsolete of Renewable Energy Policy 2008, that's why the revision of the policy is needed.

- Resource assessment for RE must need to give 1<sup>st</sup> priority.
- Inter ministerial discussion must be needed.
- Monitory authority must need included into the policy.

**12. Shamim Ahmed, AD, SREDA-** priority based problem is needed to be addressed.

- Scope of improvement of RE policy must need to be addressed.
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**13. SM Abdul Mannaf, SE(Planning), CPGCBL-** He questioned that, how many solar home systems (about approximately 6 million) was installed, how many were effective and workable and if not effective then why?

- Was there any possibility to supply energy to the neighboring firms instead of greed integration.
- Policy must need about the producer and consumer where utility remain absent.

**14. Eng. Saiful Islam, SE (P & D), APSCL-** Needed to be addressed about the incentive for transferring from captive power to RE.

- Capacity payment must need to include for storage facilities of grid integration.



**15. Ashiqur Rahman, Executive, SMMAB-** Priority must need to give for expanding local battery producer instead of importation.

**16. Mohammad Golam Sarware Kainat** - Needed to further investigate about thermal resource of RE.

After Mr. Kainat's opinion TL sir was invited for expressing his opinion on those questions and comments.

TL sir assured Mr. Tanvir to incorporate in the policy about priority wise RE sources and also assured about conducting the inter-ministerial meeting. In the answering of Mr. Shamim Ahmed's question TL said that, the problems were collected from the KII with different level stakeholders and also assured him that the scope of improvement of RE policy will also incorporated in the draft report. There was provision to supply the produced energy to the neighboring firms, TL answered according to Mr. Ashiqur Rahman's desired. Though there were no thermal resources yet in Bangladesh but in the policy, it should be included because there will be a scope for introducing this in Bangladesh in future, TL answered of Mr. Kainat's question. At last TL thanked everyone again.

After that Mr. Kainat provided the floor to Mrs. Zakia. Mrs. Zakia thanked Mr. Kainat for the discussion session and welcomed Mr. Golam Mustafa for his speech.

**Md. Ghulam Mustafa, Member (Additional Secretary), SREDA-** At first, he thanked the present participant of the workshop. He opined that the present study was run in broad sectors comparison with the RE policy 2008. He also mentioned that, it will be needed to highlight about the loan in the RE policy. He thought that, if every energy production and distribution organization included into RE, that will be more effective and will be played a good role in grid integration. VAT, TAX of RE is needed to be up to date. He also emphasized on the monitoring sector of RE.

After giving thanked to Mr. Golam Mustafa for his speech Mrs. Zakia invited Monira Sultana, ndc, Chairman (Grade-1), SREDA for her valuable speech.

**Monira Sultana, ndc, Chairman (Grade-1), SREDA-** She welcomed and thanked everyone for attending and fluently participating in the workshop. She informed that the action plan would be highlighted to keep RE policy 2008 as a base. And also needed to keep in mind that what types of policy would be better for our country similarities with the other countries policy. She informed that, SREDA safe 39-44% electricity just practiced switched off the electricity for one hour per day. So, she influenced everyone to keep in mind about the Green Code at the time of building construction, which included ventilation and best use of natural resources. She also pointed out that, waste power system was present in the city corporation but it faced lack of quality waste. So, cost effectiveness also needed to be considered for any technology adoption in case of RE sector. She further highlighted toilet system that will turn human waste into electricity and fertilizers also to the team about the backward and forward link of the RE sector. She also added that, the cost effectiveness of the 11KV connection line in case of net metering. She opined that the different agency of Bangladesh Government included with this sector. So, the team needed to discuss with the all agencies. She also referenced different countries RE sectors. At the end of her speech, she again thanked everybody.

## Annexure-2 Workshop Meeting Note

Mrs. Zakia thanked to the Monira Sultana for her valuable speech and requested Mr. Kainat for his speech and to close the workshop.

**Mohammad Golam Sarware Kainat, Member (Joint Secretary), SREDA-** He thanked to all at the beginning of his speech. He said that the production and uses of bio-gas is needed to be addressed thoroughly in the policy. The barriers of the enter ministerial needed to be addressed in the policy. Lastly, he gave thanks to every person for participating in that workshop and he also closed the workshop.

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