

Policy Brief

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Policies and Institutional Practices for Renewable Energy in Bangladesh*

1. Introduction

Demand for energy especially for electricity is increasing as a result of population growth, industrialization and the increasing availability of and demand for modern household appliances. Energy is essential for both economic growth and human development in a country leading to a strong bidirectional correlation between economic development and energy utilization. For Bangladesh to attain a sustainable GDP growth of 6% and above till 2030 and beyond, it is necessary to meet the essential energy needs. The ever growing demand for power emphasises on energy sustainability. Moving towards energy sustainability, however, will require development in both supply of renewable energy and its efficient utilisation. The United Nations General Assembly declared that the period (2014-2024) would be the Decade of Sustainable Energy for All (SE4All)¹. Energy efficiency and renewable energy (RE) are the twin pillars for sustainable energy (Bill Prindle and Maggie Eldridge, 2007)². According to SREDA³, the improvement of energy efficiency will primarily have a two-fold impact; one is improvement of national energy security and another is efficient environmental management. The efficient energy utilisation movement will lead to greater output from equal

quantity of primary energy in Bangladesh and subsequently low carbon emissions from its efficient utilisation. To meet energy demands, renewable energy sources such as solar can be used besides other sources. However, abundant reserves of renewable energy resources will not be able to ensure energy security and sustainable economic growth in the absence of good governance.

Improving access to energy in Bangladesh is a fundamental support to poverty reduction and key to accomplishing the United Nations Sustainable Development Goals (SDGs). Ensuring access to affordable, reliable, sustainable and modern energy for all is the 7th target of SDGs. One component of the 7th goal is to expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, and Small Island Developing States. To meet the future energy demand development of sophisticated technology for exploiting renewable energy resources is a must which require research and technological improvement. But adequate attention has not been given to address this issue. Bangladesh is highly dependent on indigenous natural gas (88 percent) for its primary energy supply as well as for power generation. So this dependency must be minimized for sustainable resource use. Government of Bangladesh (GoB) also intends to encourage the private sector especially small and large companies to set up solar panel to supply electricity to large consumers but it did not provide any support scheme for them. GoB has undertaken a new mandate that all the each individual, Government non-government and autonomous institution are to have rooftop solar panel. Connecting individual solar panel with national grid can act as a practical way to induce people to do this. In many places, uses of poor quality batteries in solar panels have discouraged farmers to use solar system. Research initiatives are not up to the mark to explore the alternative sources of environmentally sustainable renewable energy.

2. Significant Policy Reform

Bangladesh suffers with hefty energy crisis with the ongoing expansion of economic activities of the

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1. Synergies Between Renewable Energy And Energy Efficiency. (2015, August). A Working Paper Based on Remap 2030. IRENA and C2E2.
2. Bill Prindle and Maggie Eldridge. (2007). The Twin Pillars of Sustainable Energy: Synergies between Energy Efficiency and Renewable Energy Technology and Policy. American Council for an Energy-Efficient Economy (ACEEE). Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.545.4606&rep=rep1&type=pdf>
3. SREDA Stands for Sustainable and Renewable Energy Development Authority which operates under the Power Division, Ministry of Power, Energy and Mineral Resources, GoB.

country. Besides the impact of climate change and environmental pollution has also been significantly felt. It is also perceived that exploitation of mineral resources should be in consideration of sustainable environment to achieve energy security for the country through supply of sustainable energy services. The uses of renewable energy sources have been considered as priority for formulating the effective energy policies which can be interlinked with the Millennium Development Goals as well as the newly declared Sustainable Development Goals. The key policy reforms in Bangladesh are discussed briefly as follows.

- The Environment Conservation Act, 1995
- The Environment Conservation Rules, 1997
- The Environment Conservation Rules, 2012
- National Energy Policy 1996
- National Energy Policy 2008⁴
- Renewable Energy Policy 2008
- The Sustainable and Renewable Energy Development Authority Act, 2012 (SREDA)
- Policy Guidelines for Small Power Plants (SPP) in the Private Sector” in 1998,
- Guidelines for Remote Area Power Supply Systems (RAPSS) in July 2007,
- Policy Guidelines for Enhancement of Private Participation in the Power Sector in 2008

2.1 Environment Conservation Act and Rules

The Environment Conservation Act, passed in 1995 can be considered as the most legislative documents for industrial water pollution. Its deeds try to lead to better management of scarce resources, reducing the rate of environmental degradation, improving the natural and manmade environment, conserving habitats and biodiversity, the “conservation, improvement of quality standards, and control through mitigation of pollution of the environment”.

The 1997 Environment Conservation Rules were made in accordance with the powers conferred by section 20 of the 1995 Act. It provides additional guidance for specific components of the Act. The major feature of this was the declaration of ecologically critical areas (ECA) by department of environment in certain cases where ecosystem is considered to be threatened to reach a critical state. The Environment Conservation Rules (2012) made to provide additional information (procedures to be followed by the local government authority in issuing such a “No Objection Certificate (NOC)”) regarding the rule 7 of the 1997 Environment Conservation Rules.

⁴ National Energy Policy, 2008. Retrieved from <http://www.bdlaws.gov.bd> (released on 26-10-2008).

2.2 National Energy Policy (1996)

The National Energy Policy (1996) includes Non-Renewable Energy Policy (GSB, Petro Bangla, BPC, Local & Foreign Private Sectors), Petroleum Policy (Approved in 1993) (Petro Bangla, BPC, IOC, Private Sector), Power Policy (BPDB), Rural Electrification Policy (REB), Renewable and Rural Energy Policy (absence of institution) and Private Power Generation Policy 1996. One of the seven 'objectives' (section 1.2) addresses the environment and says “to ensure environmentally sound sustainable energy development programs causing minimum damage to environment”.

Policy issues include both ‘energy conservation’ and ‘environmental consideration issues’. ‘Energy conservation’ requires “an end-use based energy planning process method to be undertaken to incorporate energy conservation measures in energy planning process”. Environmental issues will be conserved for all type of fuels and in each and every step of fuel cycle, namely, exploration, appraisal, extraction, conversion, transportation and consumption. It may be reiterated that at present per capita emission of carbon dioxide is very low. It is envisaged that in foreseeable future, emission of carbon dioxide gas would not exceed the existing average emission (0.3 metric tons per capita in 2011) of low income developing countries.⁵

2.3 Private Power Generation Policy (1996) and Guidelines for Small Power Plants (SPP)

The private Sector Power Generation Policy of Bangladesh was adopted in 1996. In addition, the Government of Bangladesh (GoB) has decided to allow private sector investors to establish Small Power Plants (SPP) on a fast track basis, for generation of electricity for own use and sell the surplus to other users. The SPPs will be developed on a mode of Build-Own-Operate (BOO) basis. Policy has also been designed to promote small-scale generation in the private sector particularly to serve non grid areas, pockets of continued power shortage and provide opportunity for sale of excess power from captive generation to consumers in the neighbouring areas. REB/PBS is nearing finalization of contracts for 3 (three) 10 MW plants in the private sectors.

2.4 Guidelines for Remote Area Power Supply Systems (RAPSS) in July 2007

The main objective of this guideline is to provide incentive for supplementing the efforts of the Government to accelerate the coverage of electricity in remote and isolated areas. In this respect, the Government intends to promote the concept of Remote

⁵ <http://data.worldbank.org>

Area Power Supply Systems (the “RAPSS”) with private sector investment. Under the RAPSS concept, private investor will be given an area (the “RA.PSS Area”) for the development and operation of the electricity distribution and retail supply system including generation (in case of necessity as determined by the Government) as a utility operator for a period up to 20 years.

2.5 Renewable Energy Policy (2008)

The salient feature of the renewable energy policy of Bangladesh was to develop sustainable energy supplies (Promote local technology in the field of renewable energy) to substitute indigenous non-renewable energy supplies and thereby scale up contributions of renewable energy both to electricity and to heat energy. For this purpose creation of enabling environment and legal support to encourage the use of renewable energy has been considered. The step to establish an institution, Sustainable Energy Development Agency (SREDA), under the Companies Act, 1994 has been undertaken here.

Introduction of green energy tariffs which provide consumers an opportunity to co-finance through their electricity bills to the development of new renewable energy sources was proposed in this policy. Also to provide incentive for public and private investors to invest in renewable energy projects government has announced an exemption from corporate income tax for a period of 5 years and it will be extended periodically following impact assessment of tax exemption on renewable energy. Moreover, an incentive tariff will 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. Use of electricity and gas for water heating has been discouraged in order to promote solar water heaters.

2.6 Policy Guidelines for Enhancement of Private Participation in the Power Sector in 2008

After the adoption of Private Sector Power Generation Policy (PSPGP) in 1996 Government of Bangladesh

issued a vision statement on power sector reforms with the objective of providing access to affordable and reliable electricity to all by the year 2020. To meet the existing power shortage and demand growth in future years for GoB augmenting generation capacity is a priority. In line with this GoB has adopted large generation capacity addition through the public sector entities and Independent Power producers (IPPs), tendering out small power plants on fast track basis and encouraging procurement of surplus power from Captive Power Plants (CPPs) and Small Power Plants (SPPs).

GoB intends to allow the private sector to set up Commercial Power Plants to supply electricity to large consumers on mutually negotiated tariffs, to use transmission and distribution lines of Power Grid Company of Bangladesh (PGCB) and Distribution Licensees on a non-discriminatory basis for wheeling of power produced in their existing as well as new Commercial Power Plants. Also rehabilitation option for old and inefficient power plants owned by the public sector power utilities on rehabilitate, own and operate (ROO) or rehabilitate, operate and transfer (ROT) model and develop new Joint Venture Power Plants in partnership with public sector power utilities.

2.7 Sustainable and Renewable Energy Development Authority Act, 2012 (SREDA)

The Sustainable and Renewable Energy Development Authority Act was established in 2012 under the ministry of power, energy and mineral sources, government of Bangladesh. It is intended to promote sustainable energy and builds an energy conscious nation to ensure energy security and to reduce carbon emission.

In support to the goals of SREDA, the government has prepared a Power System Master Plan-2010 (PSMP) to improve and expand electricity supply to support GDP growth in the 7 to 8 percent range. To meet the demand with reasonable reliability, installed capacity to be increased to 24,000 MW and 39,000 MW by 2021 and 2030 respectively. The Renewable Energy Policy

Table-1: The year wise plan for solar energy by GoB

Renewable Energy Technology	2015	2016	2017	2018	2019	2020	2021	Total
1. Solar	75	336	421.75	237	195	203	208	1675.8
2. Solar Home System (SHS) (in capacity MW)	30	30	30	30	8	6	6	140
3. Solar Mini/micro/Nano grid (in capacity MW)	6	6	32.25	0	0	0	0	44.25
4. Solar Irrigation (in capacity MW)	30	30	162.5	0	0	0	0	222.5
5. Solar Park (MW)	3	263	190	200	180	190	195	1221
6. Solar PV in Govt. installation (MW)	2	3	3	3	3	3	3	20
7. Solar PV in private installation(MW)	4	4	4	4	4	4	4	28

Source: SREDA (2015)

obligates the RE share to be 10% by 2020 that means it would be 2,000 MW. To meet this target, government has prepared a year-wise plan, which is a bit upper range from the policy target. The year-wise plan for solar energy is as follows:⁶

Since, guidelines for Remote Area Power Supply Systems (RAPSS) in July 2007 was not successfully implemented as local investors were not much interested to implement the scheme. The Sustainable and Renewable Energy Development Authority Act, 2012 (SREDA) was adopted then according to the guideline provided in the renewable energy policy 2008. Statistics of electricity produced up to February, 2015 reveals the successful implementation of Policy Guidelines for Enhancement of Private Participation in the Power Sector in 2008 and Private Power Generation Policy (1996) and Guidelines for Small Power Plants (SPP).

3. Practices of the Policies and Laws

With an aim to address issues of energy development including energy production, distribution and consumption Bangladesh Government has prepared energy policies. The attributes of energy policy include legislation, international treaties, incentives to investment, and guidelines for energy conservation, taxation and other public policy techniques. Seven areas in Bangladesh were defined as Ecologically Critical Areas under the Environment Conservation Act, 1995. Despite the Act and its supporting laws and policies the environmental degradation of Bangladesh continues principally under the population pressure. The National Energy Policy in year 1996 and 2008 had not seen the outline of introducing and developing local technology in the field of renewable energy. So in 2008, renewable energy policy was formulated.

The section 12 of the Act speaks about “Environment Clearance Certificate”. It is yet unclear what will happen if the Department of Environment (DoE) is

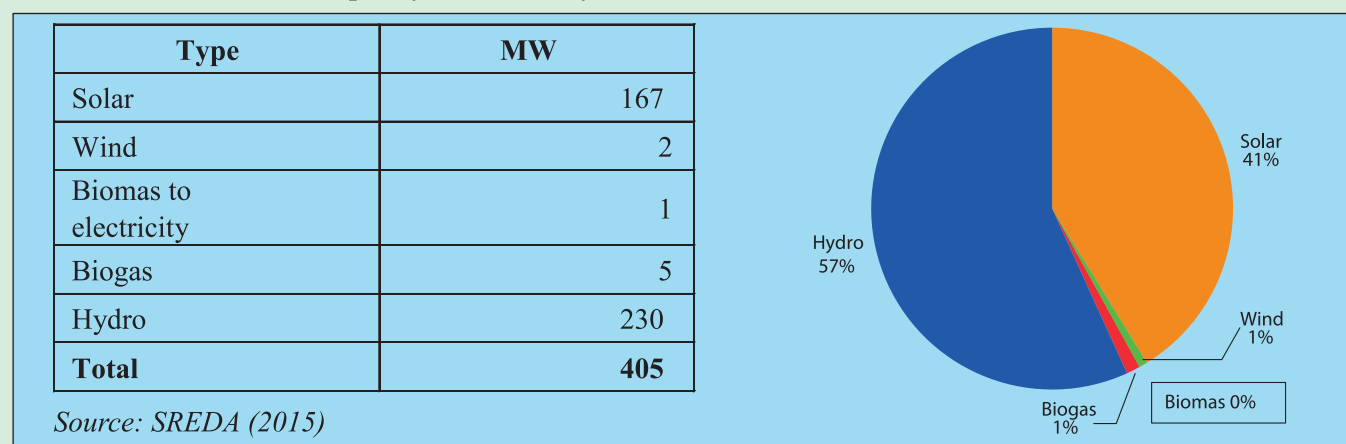
unable to meet the timetable to grant the Environment Clearance Certificate (ECC). It is also silent about the standards and parameters upon which the ECC should be obtained. It also speaks about the formulation of Environment Impact Assessment (EIA) report, but it does not prescribe the role of environment experts in preparing the EIA report. However, it provides for EIA report only of the industrial projects not of the non-industrial projects. As per Rule 7 of the Bangladesh Environment Conservation Rules (BECR), 1997, the industries belonging to highly polluting Red categories must obtain “No Objection Certificate (NOC)” of the local government authority. But the Conservation Act or Rules does not provide any procedures to be followed by the local government authority in issuing such a “No Objection Certificate (NOC)”.

Necessary attention has not been given to formulate appropriate policies to encourage private sector participation in energy sector development program in this policy. To meet the energy requirement despite the financial constraints of the country development of local technological capacity is required. This requires development a systematic survey, exploration and exploitation of energy resources through research which has not been undertaken previously. Furthermore, efficient operation of the energy agencies has not been ensured. The policy has not addressed the contribution of inefficient use of fuels to environmental degradation.

To ensure sustainable development of energy sector, updated National Energy Policy will address various issues to overcome shortcomings mentioned above.

No Comprehensive Review of Performance of NEP 1996 has been made up to 2008. The Renewable Energy Policy of Bangladesh, adopted in December 2008 encourages the use of RE focusing on development of local technology in the field of RE. The goal is to substitute indigenous non-RE supplies and to scale up

Capacity of Electricity Production from Renewable Sources



⁶ <http://www.sreda.gov.bd>

the contribution of RE to electricity production and heat energy. Additionally, it emphasises on promoting clean energy for the clean development mechanism with an aim to expedite appropriate, efficient and environment friendly use of RE. The policy has considered facilitating public and private sector investment in RE projects.

Up to February, 2015 the electricity production amount was 7418 MW per day while capacity was 11265 MW. It can be noted that only 3.6 percent electricity is now being produced from renewable sources.⁷ The electricity production would be 5% by 2015 [Perspective Plan (2010-21)] which is yet realized.

RAPSS is not implementing rather Government of Bangladesh gave emphasis on renewable energy through Infrastructure Development Company Limited (IDCOL) to promote solar PV panel to isolated areas for accessing to electricity facilities. About 40 per cent of total electricity production was carried by private sector (Bangladesh Economic Review, 2015) which is much appreciating. Government is trying to utilize the urban and commercial rooftops for establishing solar systems. Government is also promoting improved cook stove throughout the country. Currently there are no institutions and policy directions for efficient usage of electricity. Besides that energy pricing is not optimal which is very important for addressing the issue of efficient usages of energy.

4. Institutional Reforms in Energy Sector

In 1998, Ministry of Power, Energy & Mineral Resources (MOPEMR) was divided into two divisions named as Energy & Mineral Resources (EMR) Division and the Power Division. The Hydrocarbon unit has been attached to EMR Division in 1999. This unit provide opinion, recommendation to the ministry on production sharing contract and joint venture agreement including policy formulation. It also assist the ministry in over viewing and monitoring of activities involved in petroleum refining, marketing and other related activities. Reviewing of mining resource valuation and providing suggestion on mining proposals is another activities performed by this unit. Petro Bangla Companies have been corporatized under Company's Act 1994.⁸ To provide energy for sustainable economic

growth and maintain energy security of the country is the main objective of this entity. In 2000, Bangladesh Petroleum Exploration and Production Company Limited (BAPEX) was transformed to Exploration & Production (E&P) Company and participation of International Oil Companies (IOCs) was started. Power Cell has been attached to Power Division for implementation of Bangladesh power sector reform project to carry forward the power sector reform activities of the government of Bangladesh. Some BPDB units have been unbundled and corporatisation and participation of Independent Power Producers (IPPs) has been introduced.

In 2012 Sustainable and Renewable Energy Development Authority (SREDA) has been formed under power division. According to the National Renewable energy policy 5% of total power is estimated to be from renewable sources by 2015 and 10% of total power by 2020. Energy saving target should be 10% of the total energy consumption by the year 2021 and 15% by 2030 of. By achieving RE and energy saving targets the carbon emission will be reduced to by 2021 and by 2030. SRDEA has set three goals in support to target of Government. They are 5% (800) MW power from renewable by 2015 (including Hydro), 10% (2000) MW power from renewable by 2020 and 10% (4000) MW power from renewable by 2030.

5. Energy Situation & Future Energy Mix of Bangladesh

Per capita energy consumption of Bangladesh is one of the lowest in the world. Major portion of energy is consumed for Subsistence (e.g. cooking, lighting, heating, etc.) And small portions for economic growth (e.g., agriculture, industry, transport, commerce, etc.). An empirical study found that the energy use acts as an important input for fostering economic growth (Christopher M. Chima, 2005)⁹.

Companies using renewable energy projects (less than 5MW) to generate electricity for customers are exempt from corporate income tax for 10 years. Renewable energy equipment/raw materials are exempted 5% of VAT. Government has provision of duty exemption for solar, LED and wind power plant. Bangladesh Bank, Infrastructure Development Company Limited (IDCOL), Commercial banks and donors like Gesellschaft für Internationale Zusammenarbeit (GIZ) are involved in promotional funds for Renewable Energy Projects.

⁷ Total Capacity= 11265 MW and Total Plant Capacity from Renewable Sources= 405 MW [Bangladesh Economic Review 2015]

⁸ Being corporatized, Petro Bangla companies (currently, eleven companies are operating under Petro Bangla) started dealing with exploration, production, transmission, distribution, conservation of oil and gas resources and development of coal and hard rock mines, marketing of the mined products and alternative use of oil and gas resources as a single entity. It works under Power, Energy and Mineral Resources Affairs Government of the People's Republic of Bangladesh.

⁹ Christopher M. Chima and Rodney Freed. (2005, December). Empirical Study Of The Relationship Between Energy Consumption And Gross Domestic Product In The U.S.A. International Business & Economics Research Journal, 4(12).

Energy Efficiency Action Plan

To meet the target Bangladesh government has already launched the '500 MW Solar Power Development Program' in 2015. This target is divided into two projects, one is commercial projects (340 MW) and another is Social Solar Projects (160 MW). The former consists of Build Own Operate (BOO) and Remote Area Power Supply Systems (RAPSS). The latter consists of Health Center, Remote educational institutes, Union Information Centers, Unelectrified Religious institutes, Railway stations and Government Offices in off grid location. SREDA has also initiated pilot study for Solar power boating system, Solar water heating in industries, Solar based water pumping in fish culture, Study on bio-gas and biomass potential in Bangladesh and its GIS mapping and Municipal waste to electricity.

Recently SREDA has started promoting innovative mechanism to ensure energy efficiency and conservation at industries, residential and commercial buildings and in service sector. Power Division and SREDA organising seminar and workshop on it in regular basis to create awareness among relevant stakeholders.

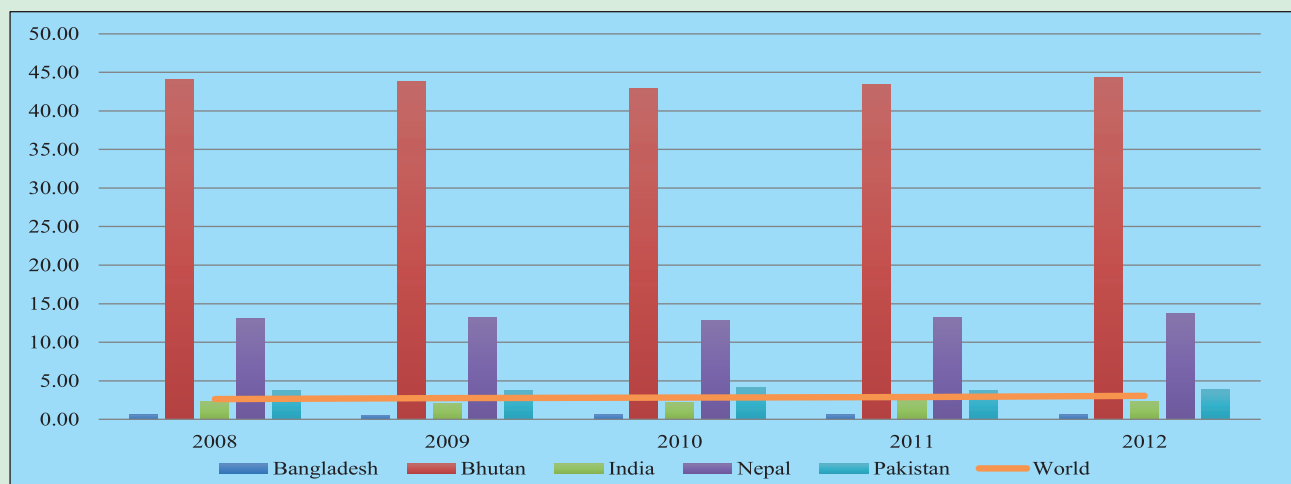
Government has prepared Energy Efficiency Action Plan with some specific targets mentioned previously. A total of 39 interventions have been identified in industrial, commercial and residential sectors. Under Energy Efficiency & Conservation Master Plan up to 2030 with an aim to improve energy efficiency in generation, transmission & distributions introduction of time of use (ToU) and prepaid metering have been proposed. Replacement of energy inefficient electrical equipment and appliances by efficient one and discourage unnecessary lighting and illumination in community centers, markets and in residential buildings have been proposed. Commercial and Industrial Re-lamping

Programme haven been taken into consideration. To improve boiler and furnace efficiency introduction of solar water heater and waste heat recovery and co-generation in industrial have been recommended.

Gas-driven simple cycle power stations are being converted into combine cycle power stations. Revision of 'Building Code' to incorporate energy efficiency and solar energy issues are in process. Reduced consumption of energy, such as Energy efficiency measures, alternative and renewable energy subjects have been introduced in the national text book curriculum, madrasa and colleges. Moreover, installation of solar panels in all the Government non-government and autonomous institution is going on. Consumers are encouraged to use LED and energy efficient lights and limiting the use of air conditioners. Introduction of Energy Audit System in the large designated consumers is in the process.

In a low-carbon world where balancing generation from fossil fuels may be limited, the main challenge in achieving these high penetration levels will be the capacity of energy systems to manage the consequent variability in supply. And in this context, the countries whose GDP growth rate is highest currently are emphasizing more on renewable energy consumption for meeting the electricity demand. And our economy is enjoying the stable GDP growth rate for almost two to three fiscal years. To make this GDP stable and aim for increasing the GDP level government should now emphasize more in solar power consumption. Solar power is particularly relevant to the developing countries like Bangladesh where solar resource is high and solar power with storage is likely soon to become a more cost effective option than diesel generators. The International Energy Agency (IEA) estimates that solar power could generate 22% of the world's electricity by 2050.

Figure 1: Percentage Share of RE in Total Energy Consumption¹⁰

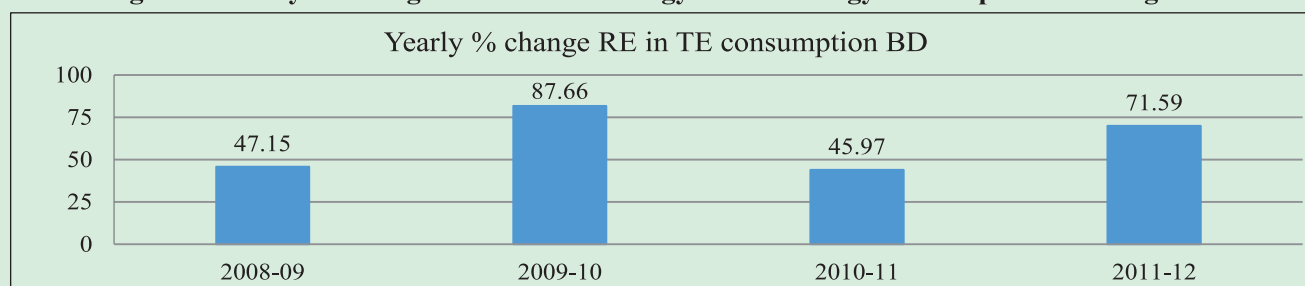


¹⁰ The International Energy Agency (IEA)

Bhutan has the highest percentage of renewable energy usage out of its total energy consumption (Figure 1). Current consumption for Bangladesh ranges from 0.56 to 0.60 which is significantly lower than the target of 5% by 2015. Consequently, the Government of Bangladesh has decided to invest US\$1.0 billion in a Bhutanese hydropower plant from which Bangladesh would import electricity. In December 2015, Memorandum of Understanding (MoU) exists between India and Bangladesh for Renewable Energy Cooperation and between Bangladesh and UK to support R&D in renewable energy and energy efficiency. In 2008, the World Bank provided US\$350

million to build a 300MW gas turbine power plant in Siddhirganj. In the face of increasing power demand and gas shortage, the government decided to convert it to an energy-efficient 335 megawatt combined cycle power plant. The World Bank is providing an additional US\$177 million fund to the Siddhirganj power project to boost its production capacity and lower gas consumption. The plant will account for 6 percent of the total electricity delivered to the national grid. The combined cycle technology allows the plant to produce higher energy with lower gas consumption, and reduces carbon emission. The plant will start commercial operation in 2016.

Figure 2: Yearly % change of renewable energy in total energy consumption for Bangladesh



The above figure illustrates the annual percentage change of renewable energy consumption in total energy consumption for Bangladesh only. The country experienced a drastic increase in renewable energy consumption from the fiscal year 2008-09 to the fiscal year 2009-10. Again with a drastic fall in the statistics the country experienced significant rise in renewable energy consumption.

Solar Energy Programme in Bangladesh

About 70% of the total population does not have access to electricity. A major percentage of the population located in off-grid areas are unable to get electricity in the foreseeable future. This is due to several constraints, including low consumer density and inaccessibility. Renewable Energy Technologies (RET's) is playing a significant role in the far-flung remote locations of Bangladesh. Bangladesh Power Development Board (BPDB) is currently implementing Chittagong Hill Tracts Solar PV Electrification Project. Under BPDB, the project "Renewable Energy Development & Energy Efficiency Measure of BPDB." has been installed with total System Capacity of 123.55 kWp (1.23MW).

Infrastructure Development Company Ltd (IDCOL) promotes dissemination of solar home system (SHS) in the remote rural areas of Bangladesh through its Solar Energy Program with the financial support from the World Bank, Global Environment Facility (GEF), KfW, GTZ, Asian Development Bank and Islamic Development Bank. IDCOL started to finance 1 million SHSs by the end of year 2012 and it has been installed

a total of 438,000 SHSs under the program up to December 2009. BRAC Solar Energy Program for Sustainable Development has served 56,444 beneficiaries in rural off-grid areas (up to 31 March 2010). Thengamara Mohila Sabuj Sangha (TMSS) is involved in renewable energy (RE) implementation, RE hardware business, R &D, technical support, etc. As a PO of IDCOL TMSS provided 2870 SHLS till 16 March 31, 2010.

6. Policy Recommendations

Theoretically, the renewable energy resources are indispensable for green growth to be realized and also required for controlling the greenhouse gas emission. About 88 percent of country's power is currently generated from gas and about 50 per cent of the consumed commercial energy is used for power generation.¹¹ So, the domination of fossil fuel extracted energy production is evident because societies and infrastructure are evolving around them. We should go for renewable sources of energy to transit to green growth whereas have lower impact on environment and improve the alternatives to prosper. As it is not possible to give exact solution for addressing the current problems of policy documents and field level implementation plan, but some policy recommendations can be taken out.

- Each and every newly developed commercial or non-commercial buildings must have solar panel at their rooftop. The each of the individual solar panel will be connected with the national grid connection

¹¹ Source: *The Perspective Plan for Bangladesh 2010-2021*.

through adjusted metering machine which gives reading of the net electricity consumption.¹² The final electricity bill can be adjusted with the individual electricity contribution to the national grid.

- The Government can provide support scheme (such as fiscal/financial incentives) for solar panel buyers in a private sector especially for small and large companies which are engaged in electricity production.
- Adequate attention has not been given to undertake systematic research programs to develop indigenous technological capabilities for exploiting energy resources to meet the energy requirement despite the financial constraints of the country.
- Bangladesh Energy and Power Research Council should be functional to conduct research on invention of new alternatives sources of renewable resources. Research should be started into alternative PV

¹² Net Electricity Consumption = Total Received amount of electricity from National Grid- Individual Contribution to National Grid.

materials which may reduce costs and expand capacity even further.

- Energy security should be ensured through balance uses of both the renewable and non-renewable sources of energy mix by 2021
- Concentrating solar thermal power (CSP) should be used in a large scale its built-in storage capabilities allow it to be integrated more easily into the electric grid;
- Market monitoring mechanism should be developed to remove the uses of poor quality battery in solar system.
- Promoting the energy savings/efficient household amenities, inverter technologies etc. and building awareness among the mass people through all sources of electronic media about the uses of renewable sources of energy rather than fossil fuel.
- The guideline for efficient usages of energy should be documented to ensure the effectual uses of electricity.



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