

## Role of Renewable Energy in Urban and Regional Planning for Sustainable Urban development: Scope and Opportunities in Bangladesh

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## Introduction

The whole renewable energy industry is still in its infancy. At the moment, therefore, it shows little impact but enormous promise. While the global contribution is still minor Wind power, for example, has experienced annual growth rates of 30% over the last decade, and solar power is doing about as well, though from a lower starting point.

- Renewable energy sources: **Wind, Photovoltaic and Thermal Solar, Tidal and Wave Power, Biomass** etc.

The transition from fossil fuel dominated cities to an urban future marked by a radically new, renewable energy infrastructure requires entirely new tools and frames of decision-making . Climate change mitigation are actions to limit the magnitude and/or rate of long-term climate change (Fisher, B.S., *et al*, 2007).

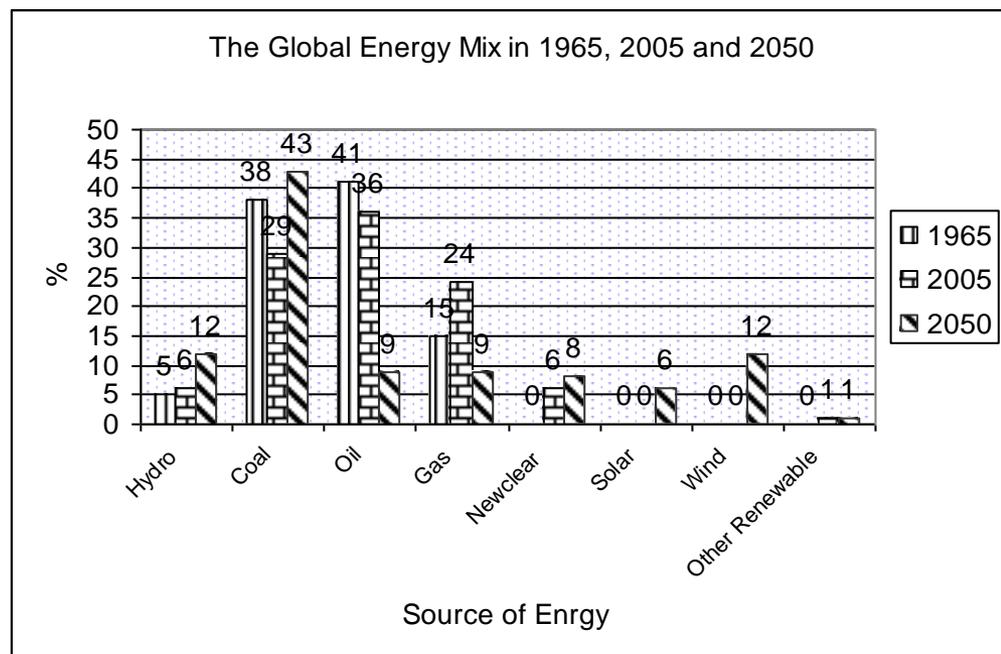
One of the major contributors to climate change mitigation is the adaptation energy technologies such as **solar power, tidal, ocean energy, geothermal power, and wind power; nuclear power, the use of carbon sinks, and carbon capture and storage**. Currently there is lack of both knowledge and usable tools combining elements, energy and urban and regional planning (IEE, 2013).

## Objectives

- To represent the present practice of RES in Bangladesh particularly in urban areas
- To assess the possibility of incorporation of RES policy in future master plans and urban planning policies, rules and regulations for cities
- To provide specific recommendations on how to promote RES under the existing system

## World Energy Sources

Global energy consumption is still **dominated by** renewable source of energy as **petroleum, natural gas and coal**. A study conducted on ‘World Energy to 2050: Forty Years of Decline’ offers a more comprehensive look at the world's evolving energy supply picture and confines its projections to the first half of the century .



## Climate Change Mitigation Measures through Urban Planning

The UN defines ‘**mitigation**’ in terms of human interventions to reduce the sources or enhance the sinks of greenhouse gases. These include using fossil fuels **more efficiently** for industrial process, electricity generation, switching to renewable energy, improving insulation of buildings and altering consumption behaviour (UNDP, 2011).

Approaches such as **New Urbanism** and **Transit-oriented development** seek to reduce distances travelled, especially by private vehicles, encourage public transit and make walking and cycling more attractive options. Between 1982 and 1997, the amount of land consumed for urban development in the United States increased by **47 percent** while the nation's population grew by only **17 percent**.

Urban areas are home to over half of the world’s people and are at the forefront of the climate change issue. At the same time, cities are responsible for **no less than 40%** of global greenhouse gas emissions, and given current demographic trends, this level will likely only increase over time. These challenges highlight the need for cities to rethink how assets and people are deployed and protected, how infrastructure investments are prioritized, and how climate will affect long-term growth and development plans.

## Global Practice

In **Europe** it has been started to outline European certificate for **energy competent urban and regional planners**. PATRES organized conference on '**Renewable energies, urban planning and building regulations: the role of local authorities in Europe**' on 20-21 October 2011 focusing on energy and environment-related issues, with a particular focus on renewables and the implementation of RES systems in the urban environment (PATRES, 2013).

In **USA** consumption of renewable sources in 2012 was **about 9%** of all energy used nationally. **About 12%** of U.S. electricity was generated from renewable sources in 2012 (Energy KIDS, 2013). The **next largest** use of renewable energy is **biomass** (wood and waste) for the production of heat and steam for industrial purposes and for space heating, mostly in homes. Biomass also includes biofuels, such as ethanol and biodiesel, used for **transportation**.

In Asia, **India** has achieved a remarkable progress in generating power from different RE sources as solar PV system, hydro projects. **China's** Renewable Energy Law, established in 2005, significantly improved the policy environment for renewable development, setting the industry on a path of continuous rapid growth.

## Solar PV System

In order to supply emergency power to the multi-storied buildings in the megacity of Dhaka, incentive based building regulations **integrating solar PV systems** have to be devised (Mazumdar, 2008). The geographical location of Bangladesh as well as Dhaka city lies in one of the best locations, which are well supportive to capturing enough solar radiation for electricity generation. Due to the availability of sunshine throughout the year the GHI of Bangladesh is also satisfactory for solar power production (Kabir et al. 2012).

## Biomass

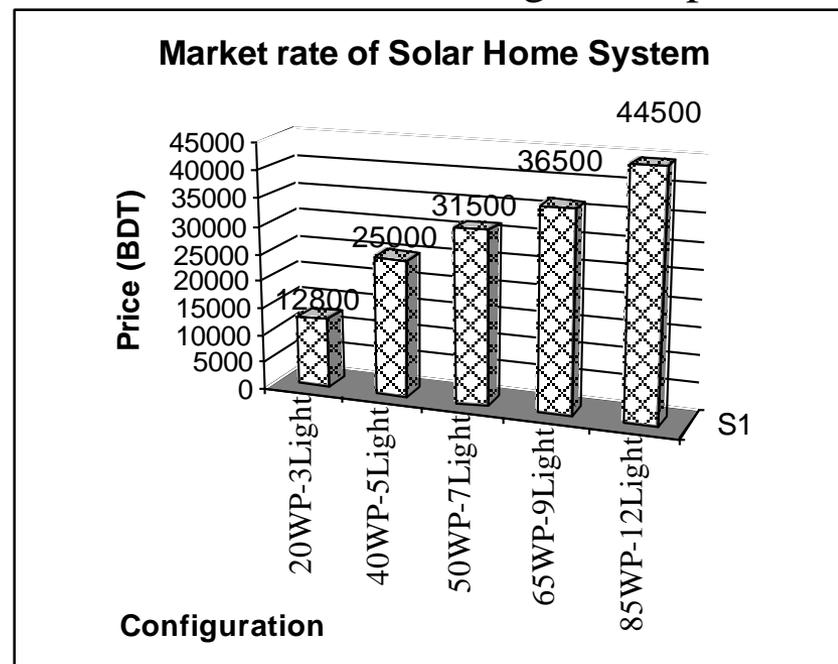
As the peripheries of the megacity are not yet developed, suitable locations for installation of biogas plants should be identified in the revised master plan. Any particular agency should be authorized to procure land for installation of biogas plant in the peripheries. This agency may be a centralized agency, NGO or IDCOL who may facilitate the process to produce biogas from segregated organic wastes of the megacity area.

## Need of Density Zoning in Dhaka

Megacity of Dhaka offers **10.554 sq-km** bright roof areas (Kabir et al. 2010). The application of solar PV systems on these bright roof-tops can generate more than **1,000 MW** of electricity (at **10%** efficiency with 75 Wp modules) preferably through grid connected PV systems. Skyscrapers constructed in **scattered way** put **shadow** on medium sized buildings. As a result roof tops are not become effective for PV application. This situation can be overcome by applying **density zoning** which will designate an specific height for a particular area and it will lead to make conducive environment of solar installation and it is feasible through incorporation the policy in the master plan.

## Market Price of Solar Home System Installation

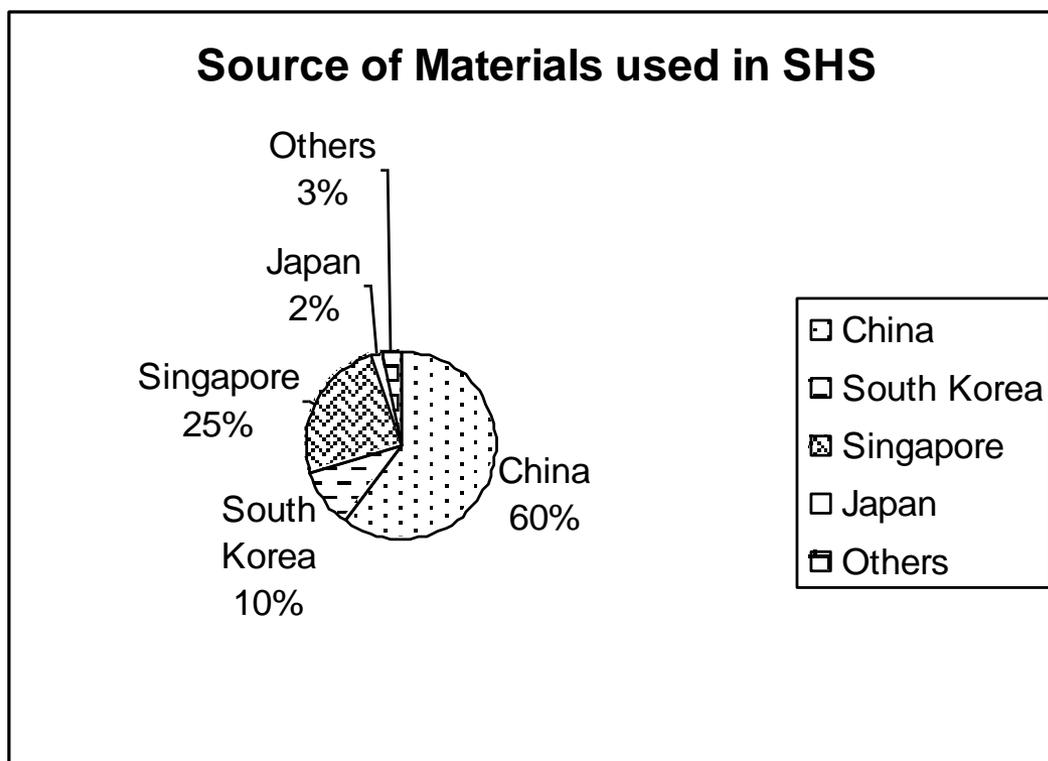
- Solar home system installed by some NGOs funded by IDCOL with the subsidy from GEF/GPOBA/GIZ/ADB
- Designed for only the clients who have still not connected with the electricity
- Installed by full payment or in .. with 25% down payment in different repayment schedule with 24% flat interest



Source: Grameen Shakti, 2013

## Technology of Solar Home System

The SHS consist of a panel run by battery, charge controller, cable, switch and clips. These are installed on roof top at 23 degree angle to south faced. The source of these apparatus are provided in the following chart.



Source: Market Survey, 2013

## Solar Policy in Building Construction Rules

The root law of building construction in Bangladesh is regarded as **Building Construction Act 1952**. Different subsequent rules have been prepared in different jurisdiction. Still now **no policy** regarding **renewable energy** has been enacted in any act or rules in Bangladesh. But it is hopeful that the **proposed Dhaka Mohanogor Building** (Construction, Development, preservation, Removal) rules which mentioned the provision of the **promotion of solar system and rainwater harvesting** in the buildings.



In Dhaka **three types** of building construction is followed. In **public sector**, building is constructed by public agencies. In **private sector** it is conducted by private owners. Thirdly, it is constructed by **developers** as joint venture, the rate of this type of construction is increasing very fast. It is unfortunate when flats are handed over, the roof is termed as common property and hardly very difficult to install solar panel in the rooftop. If it is regulated to identify at least **2'\*2'** (two feet\*two feet) per flat on the roof top, it will facilitate basic infrastructure to facilitate solar system in future to reduce pressure on national grid.

## Recommendations

- To prepare master plan incorporating national renewable energy policies and regulations to stimulate investment specially for the urban areas;
- Identify institutional, economic, and technical solutions for least-cost urban renewable energy development in Bangladesh
- Support renewable energy planning at master plan preparation stage to enable systematic development of renewable energy for future cities
- It is necessary to bring awareness and comprehensive understanding on renewable energy systems among urban and regional planning professionals. Research should be prioritized and advocacy is needed how to plan renewable energy induced cities.
- Develop roadmaps and demonstration programs for renewable energy technologies.
- Solar PV infrastructure should be incorporated in BNBC, Building Construction Rules and Regulations for facilitation and motivating people rather than compulsory imposition.

## Recommendations

- To conduct research to devise low cost renewable energy technologies compatible to our environment and social perspective
- To provide financial support in research in universities, incorporation of the technologies in secondary curriculum to motivate young generation in research and innovation in low cost technologies for future cities
- It is necessary to develop more financial mechanism for all forms of sustainable energy in Bangladesh
- Compact city model should be incorporated in the reviewed structures plans of large and medium sized cities of Bangladesh which may contribute in reducing travel distance and trip generation reducing energy consumption as well.
- It should be regulated to identify at least 2’\*2’ (two feet\*two feet) per flat on the roof top by incorporating BC rules and BNBC, it will facilitate basic infrastructure to facilitate solar system in future to reduce pressure on national grid
- Technology research should be facilitated by the Government so as to devise low cost solar equipment and apparatus in the country

# Climate-resilient Bangladesh

In the context of climate change, source of energy plays vital role. Though we overlook the impact of using fossil fuel, burning trees, coal etc., it has surely significant impact on climate change. Burning trees, coal, oil create a huge amount of carbon di oxide and other elements. As a result, it creates deforestation, air pollution, soil pollution etc. And these are the non-renewable resources. Once the source is finish, man-kind will be done with energy dependent life style. But only renewable energy can be a possible solution to this problem. Solar power, biomass, hydropower etc are not only a infinite source of energy but also environment friendly which can be helpful for a climate resilient city.

# The message

Use **Renewable Energy**,  
Make our city **Sustainable**.



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