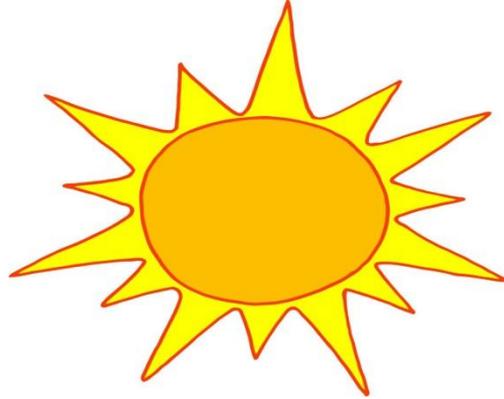


Application of Renewable Energy in Climate Change Mitigation: Scope and Opportunities in Megacity Dhaka

Kamrul Hasan Sohag
Deputy Director



Rajdhani Unnayan Kartripakkha
(Capital Development Authority)



HealthyCity

The logo for HealthyCity features a stylized sun icon above the text. The word "Healthy" is in green and "City" is in blue.

Introductory

- Climate change mitigation generally involves reductions in **human** (anthropogenic) **emissions of greenhouse gases** (GHGs).
- One of the major contributors to climate change mitigation is the **adaptation of energy technologies**. These include renewable energy sources such as solar power, tidal, ocean energy, geothermal power, and wind power; nuclear power, the use of carbon sinks, and carbon capture and storage.
- The **modern lifestyle** of people especially in the urban areas lead urban society to become **energy fed society**.
- As human settlement is the major concern, Urban and regional Planning is functionally linked with GHG emissions. Thus it facilitates the **holistic system for promoting renewable energy use by policy and programs**.

Introductory

- The 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.
- **Smarter growth** land use policies have both a direct and indirect effect on energy consuming behavior.

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

Climate Change Mitigation Measures in Urban Planning

- Urban areas are home to over half of the world's people. At the same time **cities are responsible for not less than 40% of global greenhouse gas emissions**, and given current demographic trends, this level will likely only increase over time.
- The present urban and regional planning practices in Dhaka does not consider insights how to incorporate RE policies under existing regulations.
- The existing master plan does not incorporate REs policies allocating space for waste segregation, biogas, biomass production and distribution, solid waste incineration. The present building construction rules facilitate scattered construction of high rise buildings which not only reduces potentials of solar installation but also structural end environmental hazards.

Climate Change Mitigation Measures in Urban Planning

- Inefficient [land use](#) development practices have increased infrastructure costs as well as the amount of energy needed for transportation, community services, and buildings.
- At the same time, the idea which is being popularized is smarter growth approach to land use planning. These [smart growth](#) practices include compact community development, multiple transportation choices, mixed land uses, and practices to conserve green space.
- For example, students of this institute have to live Uttara, Mirpur, Bonosree etc. area and come to the campus by using car or bus, they have to visit Nilkhet area for shopping, buying books, sometime they have to visit Gulshan for taking delicious meal. The physical development of facilities influence lifestyle of higher travel demand and more carbon emission. If the campus is connected with green streets with dormitories in nearby walking distanced, definitely it may reduce travel demand and promotes pedestrians.
- At present there exists no policies to facilitate smart growth, compact township in our master plans

Solar PV System

- The sun is the most dominant powerhouse of solar system and an endless source of energy. The amount of energy sent to the earth from the sun each year is equivalent to almost 15,000 times of the world's commercial energy consumption.
- 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).
- 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).

Biomass

- Research initiatives started in the early 1970s on biogas based power plants. The dissemination of the biogas technology has not been widely enhanced mainly due to lack of peoples awareness and willingness to pay for initial expenses.
- 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.
- Space is one of the vital requirement where to install biogas plants. 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.

Need of Density Zoning in Dhaka

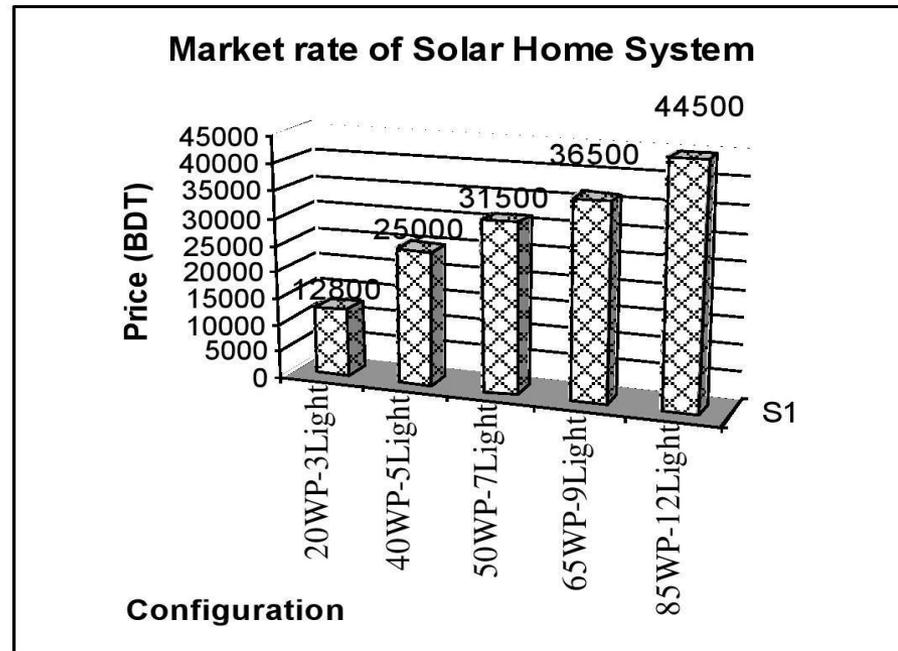
- At present Floor Area Ratio (FAR) policies one large plot is created through land accumulation and gets permission of a high rise building and the adjacent plot remain small and get permission of low rise building.
- The calculation of bright roof tops within DCC wards area shows that Megacity of Dhaka offers 10.554 km² bright roof areas (Kabir et al. 2010). This figure can be considered as a conservative estimate.
- The study also found that a considerable area (>50 km²) has not been identified for bright roof areas and nearly 10 of roof tops has been found shadow due to either buildings or vegetation coverage (Kabir et al. 2012).

Need of Density Zoning in Dhaka

- Skyscrapers constructed in scattered way put shadow on medium sized buildings. As a result roof tops are not become effective for PV application.
- 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.
- 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

At present the solar home system installed by some NGOs funded by IDCOL with the subsidy from GEF/GPOBA/GIZ/ADB is designed for only the clients who have still not connected with the electricity. The comparative market rate provided by Grameen Shakti is provided in the following chart:

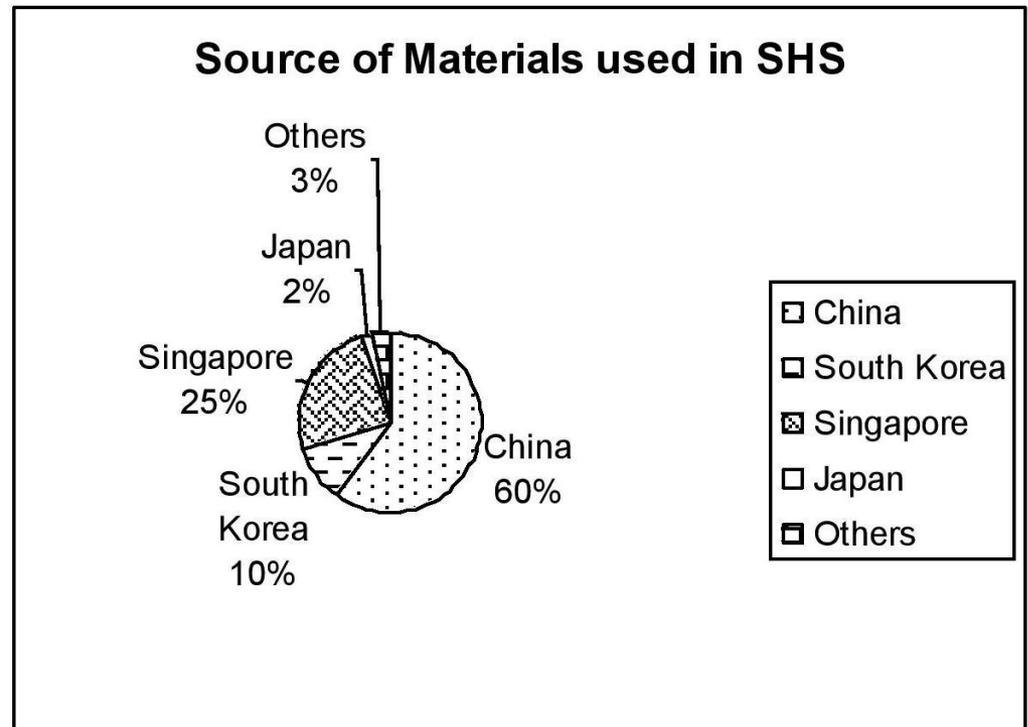


Source: Grameen Shakti, 2013

The system is installed by full payment or installment with 25% down payment in different repayment schedule with 24% flat interest.

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° angle to south faced. Most of these very low technology apparatus are imported from china, Korea and Singapore. 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.
- 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.
- 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.

Recommendations

- ❖ 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.

Recommendations

- ❖ 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.
- ❖ 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.

Recommendations

- ❖ 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

Conclusion

- For sustainable future, we can undertake right planning and policy how to survive the generation of huge population with limited resources.
- Thus it signifies the need of a transition from fossil fuel dominated cities to renewable energy infrastructure based urban planning for our dreamed cities.

Thank You..



Kamrul Hasan Sohag

Deputy Director

Rajdhani Unnayan Kartripakkha (RAJUK)

ksohag2001@yahoo.com