RENEWABLE ENERGY: the panacea for village Bangladesh

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Abstract

Renewable energy technology system (RETS) can help with poverty, energy shortage and environmental degradation such as desertification, biodiversity depletion and climate change effects in Bangladesh. The country is short of gas and electricity supply. Over-exploitation of biomass in meeting energy needs of the village people has caused the indicated environmental degradation. RETS can help fix those problems if it is widely used in the villages where people primarily depend on biomass energy. Bangladesh has enough renewables to mitigate such energy crisis and its adverse consequences. Bangladesh being an underdeveloped country, global(isation) initiative would be helpful in transferring RETS for the village households.

1. INTRODUCTION

Bangladesh has major problems of energy crisis, persisting poverty and environmental degradation. In Bangladesh, annual per capita energy consumption is estimated to be 110 kilowatt-hours. This compares with 440 kWh in India and 13,000 kWh in the United States. The supply is unreliable due to frequent load shedding. Most of the supply limited to urban areas, access to electricity in rural areas is less than 10%, so most villages are dark at night. Renewable energy technology system (RETS) can solve this problem by harnessing energy from the country's free-flowing renewables such as sun shine, wind, tidal current, water falls or river currents, sea waves and biomass. The solution of energy problem would help solve poverty and environmental problems. "Poverty (*human or environmental*) and scarcity of energy services go hand in hand, exist in a synergistic relationship" (Goldemberg and Johanson, 1995)

Bangladesh is rich in renewable for harnessing renewable energy. Biswas and Lucas (1997b) found that the useable biomass including cow-dung, human excreta, poultry waste, kitchen waste, aquatic plants and weeds of a village in Bangladesh can produce twice the amount of biogas that villagers require for cooking. The fermented slurry from the biomass digester is enriched with nitrogen, potassium and phosphorous. It is therefore, best for soil and environmental health, and agricultural productivity management. Tidal currents flow through hundreds of cris-cross estuaries across the Bay of Bengal. Harnessing energy from the "relatively big tidal amplitude of 3 to 4 metres and speed up to 30 miles per hour occurring twice a day in the numerous coastal rivers" makes the coastal belt a niche for large number of tidal energy projects. If properly studied/investigated, the tidal energy projects would even contribute substantially

towards solving electricity crisis for entire Bangladesh. Bangladesh has one of the highest rates of solar insolation on the earth. The average solar radiation varies here from 5.05 kWh/m2day in winter to 8.03 KWh/m2day in summer. As Bangladesh is a compact, flat country with little geographic variation, the solar radiation data collected at one point may be treated as reasonably representative of the whole country. Wind energy potential has yet to be made. Wind blows strongly during summer and monsoon. The available wind force seems adequate for greater part of the year. A recent report after surveying 7 coastal sites demonstrate that wind speed is relatively high during the months of April through August and low during the remaining months. The average annual wind-speed is 4.52m/sec. However, wind energy study should be extended for a longer period and at larger number of places before potential of wind energy can be reliably estimated.

Up to the year 200, the approximate number of RETS installed by the major stakeholders were (I) Solar PV 9000; (ii) Solar cooker 262; (iii) Biogas 6000; and (iv) Wind turbines 16. Though, RETS is not yet widely known and used in Bangladesh, affordable availability of RETS to the poor could be the panacea for poverty reduction and environmental fix in Bangladesh.

2. SYNERGY

Previously Bangladesh had only traditional craft-based technologies that could be used for agricultural and industrial purposes. With the change of technology, consumption culture has also changed. People are now inclined to use things produced by modern technologies than that of the traditional ones. Consequently, the traditional goods and services have lost markets. The economic axioms reveal that extant technology is necessary to keep productivity economically competitive (Jain, 1995:20). It appears impossible now to think about viable productivity without using secondary energy. Modern developmental theories therefore argue that energy is not only a necessary recurrent input to socio-economic development, but also crucial and indispensable to initiate that process (UN Energy Resources Development Series No. 34, 1993:1). The villagers of Bangladesh must first have access to energy supplies as a pre-requisite for development.

Wilson Clark, 1974:33) argues that energy can make it possible for people to work with a scale of productivity that would otherwise be impractical. He also relates energy to transportation of production of inputs and outputs and processes that need artificial light, especially at night. The relationship between energy and economic development is crucial; the process of economic growth requires the substitution of muscle energy in the performance of agricultural, industrial and domestic tasks (National Academy of Sciences, 1976:1). The lack of available energy in village Bangladesh has economic costs not just at the individual and household level, but at the national level as well. Agriculture and industry are jointly essential for economic growth in Bangladesh. Gordon Wilson considers that as dams solve the problem of drought, electricity can solve many problems to development as a multi-faceted development element/agent (Allen Tim, 1992:313-31). The proper use of energy can assure food security for the villagers. Due to the lack of cold storage facilities, many farmers have to sell their crops during the harvest period, though crops like potato and fruits are easy to preserve in the cold storage.

John Soussan (1988:62) observes that the level of economic development of a country is the most important factor influencing the pattern of energy consumption indicating that the higher the energy consumption, the greater the level of a development. Development in Bangladesh without a corresponding increase in per capita electricity and gas consumption is, therefore, not feasible. Soussan notes that every one needs energy of one form or another, for day to day life, for cooking, lighting, heating and so on, and can consequently be considered to be a basic need, along with food, water, shelter and others. This suggests that the lack of electricity and gas, and inefficient primary energy use in village Bangladesh is undermining development strategies and jeopardising the prospects of the village households for self-reliance (Soussan 1988:55).

In social aspects, energy plays key role in achieving social justice including gender justice. Low level of energy service is a serious obstacle to raising the social, and health and nutritional status of community. Dependence on human energy and primitive technologies for survival introduces a whole range of obstacles to social and gender equality. The poor in general, and poor women and girls in particular, are trapped in an unceasing cycle of works that condemns them to poor health, little or no education, and deprives them of equal participation in local development programs (literacy, credit, income generating activities), self government bodies, and social and political movements. As a result, the country's human resource base is seriously underdeveloped. Improved energy services can be at the centre of any strategy to mitigate the gender-, caste-, and class-based division of labour (Ibid.)

The availability of an adequate, reliable and reasonably priced source of electricity and gas is therefore a prerequisite to development of village Bangladesh achieving the GOB target growth (of 6-7 percent) per annum. A transition to higher GDP growth rate per annum over the medium term is critical to substantially alleviate poverty in Bangladesh, as well as achieve self-reliance (World Bank, 1995:119). As reported by the village chiefs, many poverty alleviation programs launched by both government and non-government organisations suffer or fail due to the lack of scope for productivity. It therefore follows that production of energy can create scope for economic activities and employment opportunities in the rural areas, that otherwise have limited opportunities. Suggestions can now be made to the extent that the introduction of RETS would launch a new era of appropriate technology, socio-economic and environmental development in the region.

3. APPLICABILITY OF RETS

3.1 Versatility

While commercial electricity has been the driving technology for most of the production technologies of the modern world, RETS appears to be the driving force for the village productivity. RETS can be used for providing energy for village-scale industries. At the family level, there are new energy-driven appropriate technologies and approaches which would empower poor families to make even better use of their resources (The Hunger Project, 1994). The present forms of livelihood of the villagers are not electricity or gas oriented. Due to economic, geographical and environmental barriers, the supply of energy from the centralised grid is inconvenient or uneconomic.

RETS is dispersed. It can overcome the geographical barriers and provide energy dispersedly to remote village households. RETS is undeniably appropriate for those villages or households which are situated on the Charlands (river or sea islands), in the coastal forests, on the hill tracts and relatively sparsely populated Barind Tract. Centralised power supply cannot reach or not economically viable for these areas.

Increasing appropriateness of RETS for village Bangladesh is clear. After the two decades of the inception of energy supply for village Bangladesh, it is still utterly inadequate and unreliable. Less than 10% of the rural people are connected with the national grid of electricity supply. About two-third of the country's 86000 villages are still outside the reach of the national grid. More than 80% of the households of the electrified villages are not the consumers of the grid supplied electricity. With regard to gas supply, it is unlikely that villages would ever be connected to the national grid of gas supply, though Bangladesh is believed to have good reserve of natural gas.

Traditionally, villagers use primary energy sources for their energy needs. The primary sources include fuel wood, biomass and cow dung. These have been rapidly depleting since late 1960s when the Green Revolution (GR) technologies made its way in the traditional agricultural practices of Bangladesh. The technologies that the GR brought were chemical fertilisers, pesticides and insecticides, mechanised irrigation and tilling technologies, and high-yielding variety (HYV) of crops/seeds (Islam, 1994:181). All these affected Bangladesh's primary energy sources. The depletion of biomass energy sources and the high cost of transmission of commercial energy has created a serious shortage of energy in rural areas. This has also led to a considerable occupational and environmental imbalance caused by the indiscriminate felling of trees (Khan, 1989). The shortage of biomass including crop residue and cow dung have affected the natural fertility of soil. Fertility is conceived by villagers as the energy for soil.

3.2 Poverty reduction

In this age of energy-driven technologies and availability of RETS, it is rather a paradox that villagers of Bangladesh should suffer from poverty due to energy crisis. Technological vacuum due to the lack of energy exists where village households, in general, need no use of energy for utilities like hot water system and refrigeration. Direct solar energy is used for drying crops, biomass, salt, bricks, wet clothing and fish. The village households need energy for cooking (generally twice a day); illuminating homes for a few hours in the evening, and running household production technologies that need energy. There are income generative works such as knitting, pottery etc. that need lighting, and small power to drive motors. Open wick lamps hardly can provide enough light for industrial purposes. The performance of technologies using muscle energy is less efficient and sometimes of inferior quality than that of the energy-driven technologies. Energy crisis is also impeding home-scale industrial development including home-scale irrigation facility for homestead gardening. These situations have put the vast rural areas in the pitfalls of underdevelopment. The poor often do not have access to the scarce biomass for cooking fuel. The scarcity of cooking fuel has health and gender impacts in terms of

malnutrition that fall usually more severe on women (Goldemberg and Johansson 1995).

As the lack of sufficient body energy is related to ill-health, fatigue and diseases; so is the fact of life of village families. The lack of cooking energy has adverse effect on their body energy (calorie) intake and economic activity. There is a synergistic relationship between poverty and energy. The lack of energy has chain or interrelated effects on human, ecology and the environment - which are aggravating because, as indicated earlier, rapid increase of population in Bangladesh is claiming more biomass fuels for cooking and grain processing.

The Government of Bangladesh (GOB) addresses energy crises by generating electricity from non-renewable resources such as oil, coal and natural gas. Natural gas is also directly supplied through grid and cylinders. With regard to electricity, GOB is politically maintaining its commitment of extending distribution line and supply by 10,000 km aiming at 2,00,000 connections per annum without proportionate increase of its current electricity generating capacity. Consequently, the situation is worsening off by distributing the existing amount of energy to a greater number of customers each year. Daily news papers frequently reports on how electricity supply is disturbing both city and village life and disrupting production vis-a-vis economy. Gas supply to villages and most of the remote cities through grid connection is still a dream.

3.3 Environmental fix

In addition to poverty, Bangladesh is considered as the environmental hot-spot. Excessive extraction of ground water to irrigate the green revolution varieties of crop has forced the ground water table to recede beyond the rooting capacity of many plants, shrubs and trees. Brick-based development era emerged in late 1960s, from when most of the high-rise trees began to be chopped down to fuel the brick industries. Population growth rate exceeded all the past records. In short, the green revolution technologies have not only contributed to drastically lessen the traditional biomass stock, and the population boom has led to heighten the demand for biomass energy.

Symptom of desertification in the Barind Tract of Bangladesh is clear. Depleting land fertility, forestry, biodiversity and ground water table are the visible indicators of desertification. Increasing desertification in the Barind clearly appears to pose environmental threats to Bangladesh and beyond. To counter this situation there is a need for sustainable development where RETS is essential to initiate that process.
RES can bring back the Barind's ecosystemic, biodiversity and climatic normality. It can mitigate the environmental degradation through accelerating the regenerative processes of biomass, forestry and ground water table. While scientists may differ on the notion that non-renewable energy use and unsustainable exploitations of primary energy sources are at the centre of climate change, none denies that air pollution, biodiversity depletion, land degradation, and water contamination in Bangladesh are the consequences of environmental degradation.

4. CONCLUSION

It is clear that production of renewable energy can create economic development and employment opportunities, especially for rural people, that otherwise have scanty opportunities. Renewable

energy can thus help villagers achieve self-reliance through increased productivity. It would also reduce pressure upon urban migration. It is a regular phenomenon that many rural poor and unemployed go to cities to work and live there (Thomas et al. 1993:4). As about 85% of the population live in villages, poverty reduction and environmental regeneration constitute 85% of national Sustainability. It is now, therefore, high priority for the government of Bangladesh to adopt RETS as an alternative to primary and fossil fuel energy, and inorganic manures. With RETS both the end-users and the suppliers can gain only, using unending renewables of the country. Cheap labour cost and huge market potential would put Bangladesh in an ideal position for RETS.

An early introduction of renewable energy systems simply means the easiest means of energy for Bangladesh; and a key for light in the darkness, modernity, progress, poverty alleviation, sustainable development and ecosystem reconstruction. With renewable energy technology systems, both the end-users and the suppliers can gain only.

A process of integrating RETS into development activities globally requires 'globalisation' of it. RETS can be included in global initiatives as a global sustainable development and environmental protection instrument. This would help place RETS on the front line of energy policy from its currently marginal status. The global stakeholders in energy business are required to make RETS affordable for the common people.

5. REFERENCES

[1] Biswas and Lucas. Economic viability of biogas technology in a Bangladesh village. Energy - The International Journal, Vol.22, No. 8, 1997b.

[2] Clark, Wilson. Energy for Survival. Anchor Books, New York. 1974, p 33.

[3] Goldemberg, Jose' and Johansson Thomas B. Energy as an Instrument for Socio-economic Development. UNDP, New York, 1995.

[4] Islam, Nazrul et al. Technology Planning and Control. Bangladesh University of Engineering and Technology, Dhaka, Bangladesh. 1994, p181.

[5] Jain, J.K. .Combatting Desertification in Developing Countries. Scientific Publisher, Jodhpur, India. 1986. P 20.

[6] National Academy of Sciences. Energy for Rural Development. Washington D.C. 1976, P 1.

[7] Soussan,John. Primary Resources and Energy in the Third World. Routledge, London.1988, p 62.

[8] The Hunger Project. What constitutes an enabling environment for the poor to succeed in their own development? Dhaka, Bangladesh, 1994, p.23.

[9] Thomas, J. et al. Renewable Energy. Island Press, Wasahington. USA. 1993, p 4.

[10] Tim, Allen. Poverty and Development in 1990s. Oxford University Press, UK.

1992, pp 313-31.

[11] United Nations. Energy, Environment and Sustainable Development. Energy Resources Development Series No. 34. U.N; New York. 1993, p 1.

[12] World Bank. Bangladesh from Stabilisation to Growth.World Bank, 1818 H Street, Washington. 1995, p 119.

[13] Khan, Azizur Rahman. The Strategy of Development in Bangladesh. Macmillan Press, London, 1989, p126.