



## Status of Biogas Production in Tangail District, Bangladesh

A. Nessa, S. K. Pimpi and K. Akand

Department of Environmental Science and Resource Management  
Mawlana Bhashani Science and Technology University, Santosh, Tangail-1902

**Abstract:** This research was carried out at Kalihathi Upazila in Tangail District, Bangladesh to address the prospects of biogas as an alternative source of fossil fuels and implementing biogas as a renewable energy source in enhancing the development of the study area. In order to collect required information of the research area, an interview schedule was undertaken among 80 people following a questionnaire survey. Therefore, this study could able to describe the present status of the development of biogas production in Kalihathi Upazila by analyzing the opinion of the respondents about the various aspects of biogas. For example, in the study area out of 20 biogas plants under study, seventeen (85%) plants were functioning at full capacity, three (15%) plants were not functioning at all during the time of field investigation. Among these three plants, two plants were made from cow-dung and one was made from poultry excreta. In addition, the survey data recorded from the interviewee added valuable information about using wastes for commercial purposes, create employment opportunity as well as to improve socio-economic condition of the local people by producing biogas in the study area. Furthermore, the outcome of the study indicated some issues that need to consider for the promotion and extension of biogas technology in Bangladesh especially in the research area since this could be an excellent alternative of sustainable and environmental friendly energy resources in Bangladesh.

**Key Words:** Bio-gas, Kalihathi, Poultry litter, Villages

### Introduction

Environmental degradation along with its accompanying targets, disruption of ecosystem, scarcity of natural resources is not a new phenomenon in recent time. Therefore, proper management and conservation as well as concern of sustainability has lead people to use alternative energy sources. Biogas could be an excellent alternative of convenient traditional energy sources that may produce by the conversion of different wastes materials (Balat and Balat, 2009). According to the estimation of Islam *et al.*, (2006) more than 39 million tonnes of the traditional fuel such as agricultural residues, tree twigs, jute stick, leaves and cow dung are used as fuel in Bangladesh each year although excessive use of biomass causes deforestation to some extent. Nevertheless, Bangladesh has ranked as one of the lowest rates of energy consumption per capita in the world. More than 55% of the country's energy requirement comes mainly from traditional biomass energy sources, for example, crop residue, twigs, leafs, fire wood and dung cake (SNV, 2005). Traditional biogas energy is used mostly for cooking. Dung cake fuel is one of the important traditional uses of cow dung in Bangladesh. But reckless and unplanned use of biomass is gradually leading to its consumption beyond regenerative limits with serious environmental consequences that is deforestation and in the long run increases the propensity of environmental disasters like cyclones and floods, compromising agricultural productivity and economic (SNV, 2005). According to the report of Bangladesh centre for Advance Studies (2005), 8.44 million households of Bangladesh have 22.29 million cattle

and buffalo and 116,000 poultry farms which capable to produce 22.139 tonnes of litter per day. However, dung and litter have a big impact on the environment and cultivation land in Bangladesh, e.g. dumping of poultry litter on low ground near the farms causes significant odour, dust and surface water pollution (Waste Concern, 2005). One of the most important prospects of biogas use in Bangladesh is that biogas could be cost effective, environment friendly and sustainable than other fuel's sources and assists to cut down on landfill waste as well as generate a high quality renewable fuel with the reduction of CO<sub>2</sub> and methane emissions. Considering these views present research focused principally on how animal excreta used in fuel production in the study area to meet household and commercial demand as well as to create employment opportunity and improve socio-economic status of the local people of the area.

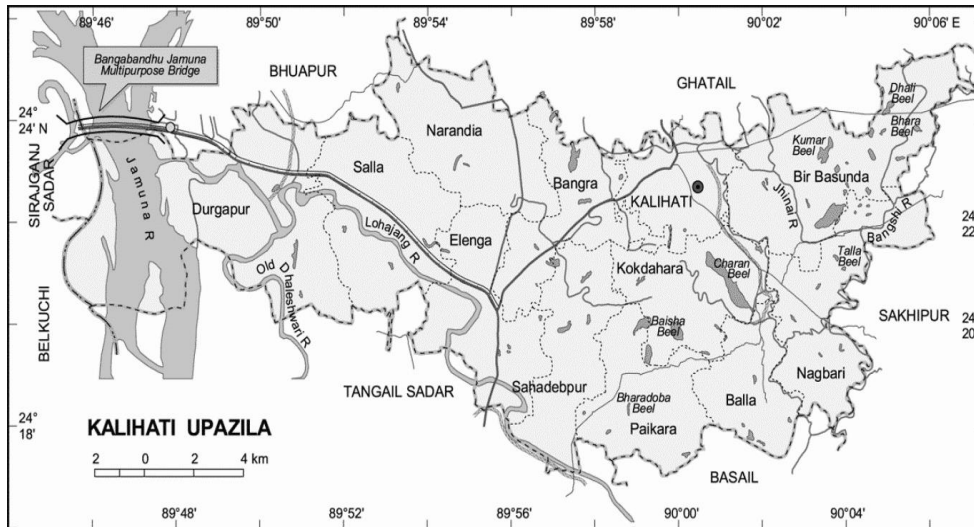
### Methodology

This research was conducted in Kalihathi Upazila of Tangail District to collect the required information on biogas production and its usages from different aspects of the research following a questionnaire survey. An interview schedule was undertaken among 80 respondents to satisfy the objective of this research. The information recorded from the interviewee added valuable information about both the advantageous and difficulties that usually faced by the biogas users of the area and reflects with literature review.

**Selection of the study area**

Tangail District is located in the central part of Bangladesh. Kalihati (Fig. 1) is one of the Upazila of Tangail District. Kalihati is located at 24° 38'33" N and

90° 00'83" E. The total area of Kalihati is 2.39 sq km with 3,54,959 population.



**Fig.1.** Map of Kalihati Upazila (Source: Banglapedia, 2010)

**Selection of the respondents**

In order to undertake this research, 80 local people were selected as the respondents. The respondents were divided into four groups based on their occupation. They were farmers, biogas owners, professionals and hotel and restaurant owners. All the respondents were inhabitant of Kalihati Upazila and were selected based on simple random sampling.

**Data collection, processing and analysis**

After collection of the survey data, they were further processed and analyzed by using Microsoft office package.

**Results and Discussions**

**Demographic analysis of the respondents**

For demographic analysis the number of respondents and percentages (%) are given below in the Table 1 with the status of sex, literacy, age and income.

Table 1: Demographic analysis of the respondents

Category		Farmers		Biogas owners		Professionals		Hotel and restaurant owners		Total	
		NR*	%	NR*	%	NR*	%	NR*	%	NR*	%
Sex	Male	17	85	11	55	15	75	12	60	55	68.75
	Female	3	15	9	45	5	25	8	40	25	31.25
Literacy	Illiterate	13	65	2	10	3	15	2	10	20	25
	Primary	5	25	11	55	3	15	4	20	23	28.75
	Secondary	2	10	4	20	5	25	6	30	17	21.25
	Higher Secondary	-	-	3	15	9	45	8	40	20	25
Age (years)	25 and below	2	10	3	15	5	25	2	10	12	15
	Above 25 and below 40	10	50	11	55	10	50	12	60	43	53.75
	40 and above	8	40	6	30	5	25	6	30	25	31.25
Income/month (Tk)	2000-5000	3	15	1	5	2	10	3	15	9	11.25
	5000-10000	7	35	3	15	5	25	5	25	20	25
	10000-15000	8	40	10	50	10	50	9	45	37	46.25
	Above 15000	2	10	6	30	3	15	3	15	14	17.5

NR\* = Number of Respondents

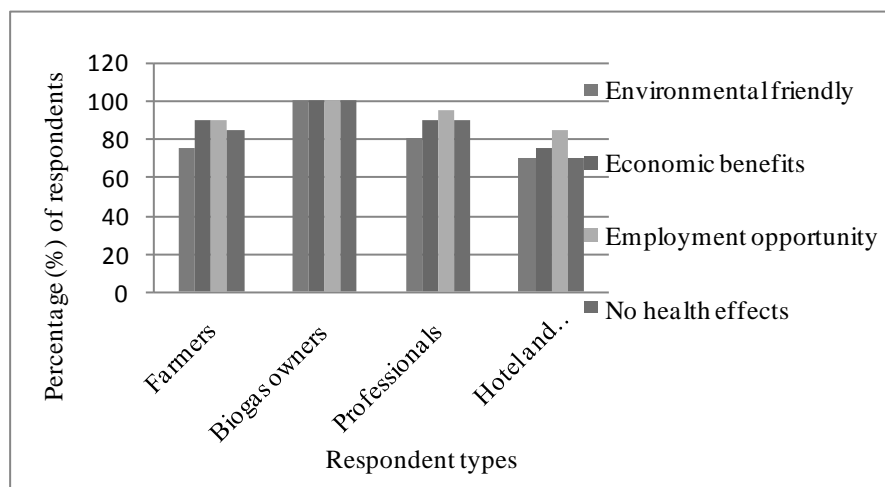
It has been accounted that among different groups of respondents, male respondents were more familiar with the beneficial use of biogas use compared to female respondents. According to the survey data, 68.75% of male respondents were concern about biogas production and its diverse benefits whereas this percentage for female was only 31.25%. In addition, in the study area 25% respondents were illiterate, 28.75% respondents had primary certificate, 21.25% respondents had completed their secondary level and 25% had completed higher secondary level.

The research findings revealed that according to the age group over half (55%) of the respondents were belong to 25 and 40 years age group whereas 31.25% respondents were between 40 and above 40. In addition, 11.25% respondents had income between 2000 Tk and 5000 Tk, 25% respondents had income

of 5000-10000 Tk as well, the income of 46.25% and 17.5% respondents were 10000-15000 Tk and above 15000 Tk respectively.

**Benefits from biogas**

Different benefits of biogas were accounted by the respondents' opinion (Fig. 3). Among the farmers, a large portion (90%) stated about their economic help that users receive from biogas and use 15% said that biogas plant is environmental friendly. 85% of them added that biogas has no health effects. However, among the professionals, 80% thought that it was environmental friendly, 90% got economic benefits and 95% got employment opportunity and 90% believes that biogas has no health effects. The highest number of hotel and restaurant owners said that it creates employment opportunity.



**Fig. 2.** Positive idea about the benefits of biogas among respondents

**Comparison between different kinds of energy users**

According to the survey results among the biofuel users, 15% of farmers, 35% of biogas owners, 25% of professionals and 5% of hotel and restaurant owners use biofuel for their daily activities. Meanwhile, in case of electricity users, 15% of farmers, 5% of biogas owners, 15% of professionals and 45% of hotel and restaurant owners were using electricity in several purposes. Moreover, in the case of both users,

60% of farmers, 60% of biogas owners, 40% of professionals and 30% of hotel and restaurant owners were using both of biogas and electricity. This is because they get supply of biofuel and electricity from biogas owner by paying small amount of money. Furthermore, in case of other users, 10% of farmers, 10% of professionals and 15% of hotel and restaurant owners were using other sources for their necessities. The comparison between biogas users is shown in Fig. 3.

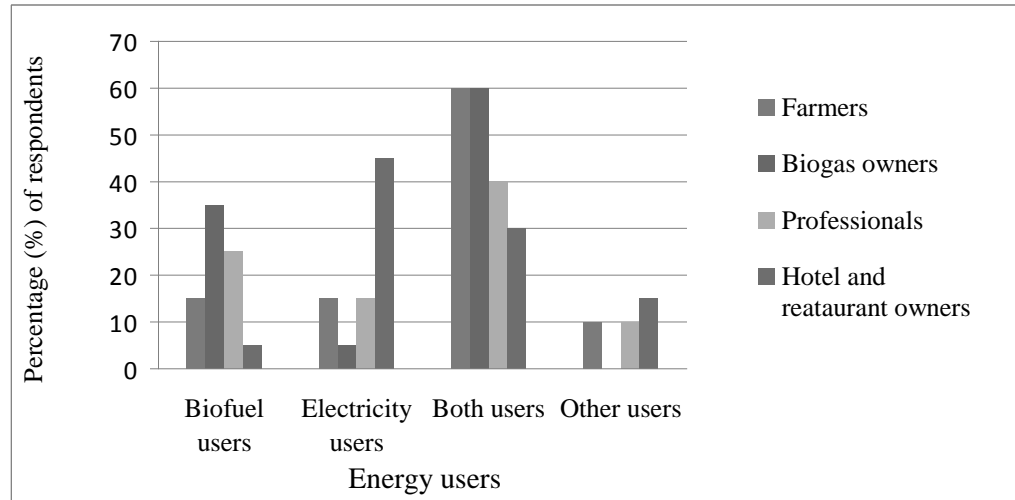


Fig. 3. Comparison among different kinds of energy users

**Comparison between Cylinder users and biogas users**

The table 2 showed a comparison between cylinder gas users and biogas users. The results illustrate that a family having 6 members required 1/2 (half) cylinder gas for one month. In one month have to pay 700 Tk.

for buying 1/2 (half) cylinder gas because 1 cylinder costs 1400 Tk.in addition, the study revealed that, 6 members holding a family could run with the biogas for which they had to pay 100 Tk. monthly to the biogas supplier. Hence, the biogas users able to save 600 Tk./month than the cylinder gas users.

Table 2: Saving money after using biogas for electricity.

Biogas users	Monthly payment for electricity/household in average (per month)	Save money/ household (per month)	Save money/household (per year)
Before using biogas	Up to 200 Tk.	Up to 126 Tk.	Up to 1512 Tk.
After using biogas	Up to 74 Tk.		

**Comparison between Bioslurry users and chemical fertilizer users**

The study revealed that all the biogas owners (100%) habituate to use bioslurry for aquaculture and agricultural practices while half of the respondents of

professionals use bioslurry for gardening and aquaculture. Moreover, 70% farmers used chemical fertilizers may be from the point of view of greater production (Fig. 4).

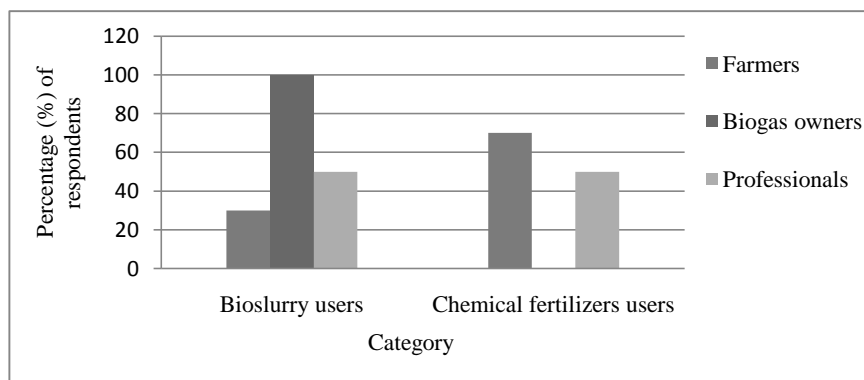


Fig. 4. Comparison between bioslurry users and chemical fertilizer users

### Conclusion

The purpose of present research was to address the prospects of biogas as an alternative source of fossil fuels of the study area. In the study area out of 20 plants under study, 17 (85%) plants were functioning at full capacity, 3 (15%) plants were not functioning at all during the time of field investigation. The 3 plants those were not functioning at all among those 2 were the plants made from cow-dung and 1 was the plant made from poultry excreta. From the study in the Kalihati Upazilla it has been proved that the biogas plant produced from poultry excreta are more powerful than the plant produced from cow-dung. In addition, the outcome of the study indicated that there are certain issues that need special considerations for speedy promotion and extension of biogas technology in Bangladesh especially in the study area. For example, modification of the design of biogas plant to suit the gas use pattern in Bangladesh; the formulation of quality standards on construction, operation and maintenance needs to be solved with proper research and development on the modification. However further research is encouraged to predict more specific results on biogas use in the studied area.

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