

## CONSTRAINTS ANALYSIS AND UTILIZATION OF BIOGAS TECHNOLOGY IN DISTRICT ETAWAH

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### ABSTRACT

*The biogas is clean efficient fuel, free of smell and smoke, can reduce time and enhance comfort in cooking. A study was conducted at Mahewa village of Etawa District, U.P. Multi stage random sampling procedure was adopted for selection of respondents and total samples selected for the study were 80 adopters and 20 non-adopter respondents. The questionnaire cum interview method was used to collect information from biogas adopters. The 78.4 per cent adopters of biogas had biogas plant of 2 cubic meters and 80% people utilized the biogas for cooking purpose. It was found that most of the adopters of biogas were literates and from agriculture profession. The 36 per cent of the adopters had annual income above Rs. 12000 whereas, most of the non-adopters (40%) had income less than Rs. 5000/-. Around 55 per cent of non-adopters of biogas had no farming land of their own. All the respondents complained about bad odour of the biogas plant followed by water collection in gas pipe (90%) and slow fermentation (88.3%), respectively. Other constraints of biogas plant were high maintenance cost (88.3), low gas production and leakage in drum and gas pipe. Biogas adopters complained about Nausea (91.6%), Headache (88.3%) and irritation in eyes and nose (53.3%). The main reason for not installing the biogas plant was lack of knowledge about technology.*

**Key words :** Biogas, Fermentation, and Constraints.

### INTRODUCTION

World supply of energy has been so heavily taxed that most investigators in different parts of the world hold unanimous view that we should undertake urgent step to decrease its use with increased working efficiency and at the same time find new sources of energy to meet our future needs. For developing country like India, biogas should be considered to have considerably higher energy. There is an urgent need to develop small scale and cottage industries in rural areas.

The technology adopted in the biogas plant is simple and becoming popular in the rural households, particularly for the purpose of house hold cooking, lighting power generation and the spent residues can be used as manure. Biogas plant is also named as cow dung gas plant or gobar gas plant as dung or gobar is only material used as feed stock.

Biogas is a mixture of methane (60%) carbondioxide (30%), nitrogen and hydrogen sulfide (10%) (miglani 1969). Out of these gases, only methane is capable of burning. The biogas is clean and efficient fuel, free of smell and smoke, can reduce time and enhance comfort in cooking. Biogas is created from fermenting cattle manure. It can be transformed into both electricity and heat. Today biogas is regarded as an important source of energy, both environmental friendly

and economical. The fermenting manure can then be used as excellent natural fertilizer.

The present study on biogas was undertaken keeping in mind the objectives to study socio economic status and awareness, construction and adoption of biogas plant as well as operative process and constraints faced by biogas adopters.

### METHODOLOGY

Mahewa village of Distt, Etawah, U.P. was selected for the present study. The questionnaire cum interview method was used to collect information from biogas adopters.

Multi stage random sampling procedure was adopted for selection of respondents and total samples selected for the study were 60 adopter and 20 non-adopter respondents.

### RESULTS AND DISCUSSION

The 26.6 per cent of adopters were high school pass followed by 23.3 per cent up to primary, 21.6 per cent graduate, 10 per cent came under the category of read and write and only 5 per cent had education above graduate level. It was found that 35 per cent non adopters were illiterate. It portrayed that highest percentage (38.4) of adopters belonged to back ward caste whereas, 35 and 25 per cent adopters were from upper caste and

scheduled caste, respectively. The 55 per cent non-adopters were scheduled caste.

The majority of adopters (46.7%) were from agriculture profession, 20 per cent agriculture and business, 15 per cent service and only 8.3 per cent were involved in business. As regards to size of land holding, the majority of adopters i.e. 31.8 per cent had possessed below 1 hectare land, 28 per cent 1-3 hectare land, 26.7 per cent 3-5 hectare land and only 13.5 per cent were found to possess more than 5 hectare of land. The fifty five per cent non-adopters had no land where as only 5 per cent had above 5-hectare land.

In the case of annual income, the table 1 indicates that maximum (36.6 per cent) of gobar gas owners had twelve thousand rupees annual income while, 35 per cent between eight to twelve thousand and only 9 per cent respondents had less than five thousand annual income.

The maximum percentage (40.0) of non adopters were those whose annual income was less than Rs. 5000, whereas, 15 percent non-adopters fell under the category of above Rs 12000.

**Table 1. Socio-economic status and awareness of biogas plant**

Socio Economic status	No. of adopters Percent	No. of Non adopters Per cent
<b>A. Education</b>		
1. Illiterate	13.3	35.0
2. Can read & write	10.0	20.0
3. Uptoprimary	23.3	25.0
4. Upto high school	26.6	15.0
5. Graduate	21.6	5.06
6. Above graduate	5.0	-
<b>B. Caste</b>		
1. Forward	35.0	20.0
2. Backward	38.4	25.0
3. Scheduled	26.6	55.0
<b>C. Occupation</b>		
1. Agriculture	46.7	50.0
2. Business	8.3	10.0
3. Service	15.0	15.0
4. Agri + service	15.0	15.0
5. Agri+ business	20.0	5.0
<b>D. Size of Land Holding</b>		
1. No land	-	55.0
2. 1 hectare	31.8	25.0
3. 1-3 hectare	28.0	15.0
4. 3-5 hectare	26.7	5.0
5. Above 5 hectare	13.5	-
<b>E. Annual Income</b>		
1. Less than 5000	9.00	40.0
2. 5000-8000	20.0	15.0
3. 8000-12000	35.0	30.0
4. 12000-above	36.0	15.0

It is observed from table 2 that the majority of adopters (78.4%) used two cubic meter sized gobar gas

plants whereas, 21.6 percent adopters used three cubic meter biogas plant.

The table 2. reveals that 46.6 per cent adopters used 50-60 kg capacity of digester whereas rest of the adopters used different capacity of digesters. Highest percentage (66.6) of adopters used daily feed system in biogas plant followed by 33.4 per cent adopters used batch feed system.

Results in table 2 clearly indicate that 75 per cent adopters used iron tube followed by 25 per cent adopter used rubber tube. The most of the adopters (61.5 %) reported that biogas plant was operated after 15-20 days from the date of feeding followed by 26 per cent after 10-15 days. The majority of 81.6 per cent biogas owners had buffaloes followed by 28.3 per cent had

**Table 2. Construction and operating process of biogas plant N=60**

S.N.	Construction & Operative Process	No. of Adopters	Percent
	<b>Size</b>		
1.	2-cubic meter	47	78.4
2.	3-cubic meter	13	21.6
	<b>Type of biogas plant</b>		
1.	daily feed system	40	66.6
2.	Batch feed system	20	33.3
	<b>Slurry tube</b>		
1.	Iron	45	75
2.	Rubber	15	25
	<b>Operating days for gas</b>		
1.	10-15 days	16	26.0
2.	15-20 days	37	61.5
3.	20-25 days	07	11.5
	<b>Possession of cattle for slurry process</b>		
1.	Bufalo	49	81.6
2.	Cow	31	21.6
3.	Bulluck	14	28.3
	<b>Purpose of biogas</b>		
1.	Cooking	48	80.0
2.	Lighting	12	20.0
3.	Engine/machine	-	-
	<b>Capacity of digester plant</b>		
1.	30-40	5	8.30
2.	40-50	14	23.3
3.	50-60	28	46.6
4.	above-60	13	29.6

bullocks and 21.6 per cent had cow for slurry purpose. It was clear that eighty percent gobar gas owners utilized gas for cooking followed by twenty percent who used for lighting purpose. None of the respondents used biogas for machine and engine purpose.

Most of adopters installed biogas plant for cooking purpose.

It was found that the major constraint faced by all the adopters (100 percent) was bad odour that comes from biogas plant. The 90 percent adopters faced the

problem of water storage in the gas pipe, 88.3 percent reported slow fermentation and high maintenance cost. The fifty five per cent adopters reported air problem, 76.7 percent leakage in foundation, and 73.3 per cent adopters reported that pressure rise very slowly due to insufficient gas production. None of the respondents found full production of gas in the winter season (table3).

**Table 3. Constraint analysis of biogas adopters**

S.N.	Problem	Adopters (percent)
1.	Leakage in foundation	76.7
2.	Water collect in gas pipe	90.0
3.	Leakage in drum and gas pipe	83.3
4.	Slow fermentation	88.3
5.	Bad odour	100.0
6.	High maintenance cost	88.3
7.	Air problem	55.0
8.	Less gas production	86.7
9.	Pressure rise very slowly	73.3
10.	Get full production in winter season	-

**Table 4. Health problems of biogas adopters**

S.N.	Problem	No. of Adopters	Percent
1.	Headache	53	88.3
2.	Increase breathing	32	36.6
3.	Irritation in eyes & nose	32	53.3
4.	Nausea	55	91.6
5.	Excitement	4	06.6
6.	Unconsciousness	0	-

As evident from table 4, the majority of adopters (91.6 per cent) reported the nausea problem by using gas plant. The other health problem headache was reported by 88.3 per cent adopters, while, 53.3 per cent adopters felt irritation in eyes and nose, 36.6 percent adopters felt trouble in breathing and 6.6 per cent respondents felt excitement from the use of goobar gas plant as reported by the adopters.

The table 5 clearly reveals that 25 per cent

respondents did not adopt biogas technology because of absence of male person in the family. In addition, 15 per cent non-adopters had family liabilities, 10 per cent were found to have already taken loan for other purposes. Only 15 percent adopters were not having confidence to repay the loans taken by them whereas 30 per cent reported lack of knowledge and technology about the goobar gas plant as the reason for not adopting the technology.

**Table 5. Opinion of non adopters about use of biogas technology N0=20**

S.N.	Reason for non-adopting	No. of adopter	percent
1.	Absence of male person in the family	5	25.0
2.	Family liabilities	3	15.0
3.	Already availed the facility of loans in other items	2	10.0
4.	In efficiency to pay installments of loans	3	15.00
5.	Lack of knowledge about technology	6	30.00

## CONCLUSION

The adopters were having more knowledge and more favourable attitude than non-adopters regarding biogas technology. The adopters faced constraints during use of biogas such as choking of delivery pipes because of water logging, insufficient gas production during winter and rainy season, rusting of pipe, leakage in foundation, slow fermentation, air problem and insufficient availability of dung.

The major reasons stated by non-adopters for non-adoption of biogas plant were cumbersomeness process of dung collection, preparation of slurry, its feeding and disposal, maintenance and economic constraints and lengthy procedure for obtaining loans

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