

# Biogas as a preferred choice for cooking fuel: An analysis based on some case studies in Rural Assam (India)

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## Introduction:

Biogas system has potential to meet the growing energy demand, particularly domestic thermal energy demand of rural areas in developing countries. Further, biogas is also recognized as one of the viable renewable energy options for improving energy access, waste management, and sanitation in several parts of the world. Biogas is primarily a waste to energy technology potential to contribute sustainable development goals [1] by virtue of its sustainable means of waste utilization and nutrient recycling capability. Biogas technology can be used at both domestic and community level and thus biogas is a versatile source of energy, which can be used to meet several end-uses, including cooking, lighting, and motive power generation [2].

Millions of household biogas plants are installed all over India including in the states of North Eastern region, mostly through efforts of the government sponsored schemes [3]. Energy security, particularly for domestic cooking activities through the utilization of locally available feedstock has been the primary motive. The manure management has also been considered as additional benefits. However, despite of the obvious benefits and Government's promotional efforts, the promotion of biogas has not been attractive in most of the target regions.

There are studies to analyse the reasons for slow progress of biogas dissemination which identifies some factors viz., (i) higher cost exceeding the affordable limits of users, (ii) easy availability of alternative fuels such as firewood, dung cake and (iii) lack of support and services to address servicing and maintenance [4, 5]. Provisions to address these issues are claimed in the Government sponsored schemes with some disagreement by the reported studies, particularly, the provisions of servicing and maintenance said to be improper [6]. The requirement of better management framework has also been emphasised to address the above issues [7]. The understanding of the factors prevalent at users' end is essential to plan such framework.

Keeping in view of the above, the objective of this paper is set to identify key factors related to the operation of household biogas plants among some rural users' and to understand the merit of biogas as preferred choice for cooking fuel. Door-to-door visits to the household biogas plants in three villages in the state of Assam (North East India) has been done. Information has been gathered from the households through an unstructured survey.

## Materials and methods:

Three villages, Napaam and Amolapam under Sonitpur district and Amlighat under Morigaon district of Assam were surveyed. General information of the users (family size, income, food habits, cooking fuels used, general health, education), the functionality of the biogas plants installed (type of feedstock used, collection procedure, feeding rate, labor requirement, costs involved in operation and maintenance), quality of output obtained (biogas and slurry) were gathered from 76 household biogas users.

Preliminary investigation revealed that, almost all the household biogas plants in the surveyed villages were installed under different Government Schemes. It was also found that the operational status of biogas plants in Amlighat village was better than that of Napaam and Amolapaam villages. Therefore, a comparative assessment of biogas plants present in these areas was done to understand the reasons of such differences. The users were asked about their views and experiences of management and uses of biogas as cooking fuel.

## Results:

The lack of interest in the biogas system is revealed among the users of Napaam and Amolapam villages compared to the users of Amlighat. Further investigation revealed that Napaam and Amolapam users were trained initially (at the time of the installation) about the operation of the biogas plant. However, information regarding the repairing and maintenance of the plant and uses of burner appeared to be limited. The users of these villages expressed the needs of proper training regarding operation and maintenance. The absence of dedicated turnkey workers or skilled manpower as support services might be one of the reasons of higher number of non-functional biogas plants in the two villages in Sonitpur district (figure 1). The availability of alternative fuel (solid biomass) for cooking and subsequently the provision of subsidized LPG fuel have resulted in the diminishing interest in biogas in these two villages.

Availability of proper after-installation support services for household biogas plants, coupled with the existence of cooperative milk processing rural industry (*Sitajokhola Dugdha Upadak Samaway Samiti*) in Amlighat appeared to be the motivating factors among the biogas users. The uncertainty of regular supply of cow dung was common in Napaam and Amolapam villages due to absence of commercial scale milk production. However, the ensured market for milk motivated Amlighat users to keep their biogas plants running in proper working conditions (figure 2). Biogas has been found as a preferred choice for cooking fuel in Amlighat.



Figure 1: Defunct household biogas digester in Napaam



Figure 2: Functioning household biogas digester in Amlighat

### Conclusion:

Reliable supply of feedstock and existence of after-installation support services for household biogas plants appeared as the key factors influencing the user's preference for biogas as a viable cooking fuel. The commercial scale cooperative milk production unit resulted to promote biogas system in one of the study regions which in turn helped employment generation through the after-installation support services of biogas plants.

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