

Karki, B.B., Karki, A.B. and Khadka, A. **A Study of Renewable Energy Technology with a Focus on Income Generating Activities Final Report.** Alternative Energy Promotion Centre. 8 July 2002. 40p. BSP Lib Temp No. 80.

Objectives

The objective of the study is to assess the Renewable Energy Technology (RET) development from the perspective of income generating activities and to investigate the role of RET in enhancing employment and income generating activities in the Dhading district of Nepal.

Although this study includes the findings on four important components of RET- Biogas, Micro Hydro Power, Solar Home System and Ghatta, only relevant information on biogas has been highlighted in this abstract.

Approach and Methodology

After the award of the contract the team carried out a detailed desk study. All the important literatures available in the libraries of AEPC and BSP were gone through to take note of income generating activity related to RET. The Consultant after reviewing the previous studies formulated the tools of data collection, which constitutes four structured questionnaires for four types of RET and one common checklist for conducting focal group discussions.

The present study has focused in the Dhading District of the Central Development Region. The study area has significant rate of adoption of the RET technology under consideration. Since the objective of the study is to assess present status as well as future potential of the technologies in terms of enhancing IGAs, a purposive sample of 5 users in each category of technology were selected and surveyed. In addition, four focal group discussions (FGDs) were held covering all the technology types under investigation. Trained and experienced assistants for the field survey work assisted the team. It is believed this will ensure quality standard of the data collected. The members of survey team themselves processed and tabulated data under the guidance and supervision of the team leader.

Main Findings

Characteristics of the RET Users

The highest number of beneficiaries are Bhramin followed by Newar, Gurung, Tamang and Chhetri; proportion-wise it works out equivalent to 36.5, 27.5, 13.5, 13.5 and 9.0 per cent respectively. Ethnically disadvantaged classes like Gurung and Tamang were found to benefit from the technology. All the RET users are married and are male.

19.3 per cent are literate and the remaining 48 in number or 33.1 per cent are illiterate. Schooling is higher among male, consequently there are more literate male than female, in the literate category. Similarly, the illiteracy rate among female is found to be about triple than that of male among the RET user hhs.

All the RET user hhs surveyed have their own land, which totals up to 453 ropanis and on an average own 20.6 ropanis, which is equivalent to 1.58 hectare. None of the hhs surveyed have rented in or rented out land. The land ownership per hh varies from 10 ropanis to 40 ropanis, which shows that benefits of the technology have reached even to small and marginal farmers.

Livestock rearing constitutes important economic activity next to crop farming in the rural area, accordingly all the hhs surveyed own sizeable numbers of livestock. The surveyed hhs own 81 heads of cattle and buffalo with an average of 3.7 heads per biogas user household. Every household raises goats and poultry birds, which constitute important sources of protein and additional income in the rural area.

Average Daily Use of Biogas

The biogas user hhs used their stoves for a time period of about 1.6 hours in the morning and 1.7 hours during the evening hours for cooking purpose. In the day time the stove was used for a

period of about 0.7 hour to prepare and warm up snacks. In total biogas stoves were used for a period of 4.0 hours in a day. Not a single household used biogas for lighting purpose.

Biogas and Income Generating Activity

Biogas and Crop Production

Paddy, wheat and maize are the main crops produced by the farmers in the area. The interviewed RET user hhs produced on average 1.739, 0.084 and 0.478 mt of paddy, wheat and maize respectively. If the RET user hhs sold an average of 0.405 mt of paddy and 0.098 mt of maize, none of them sold wheat. The RET user hhs also produced and sold crops like millet, mustard and potato.

Three among the five of biogas users reported an increase in crop production by 5 to 10 per cent due to the application of slurry in crops after the installation of biogas. Slurry is an important byproduct of biogas, which properly composted and applied in crops, should increase productivity significantly. Compared to farmyard manure (FYM), biogas slurry will have more nutrients, because in FYM, the nutrient is lost by volatilisation (specially nitrogen) due to exposure to sun as well as by leaching. The N: P: K content in the digested slurry is estimated at 2.7:1.9:2.2 respectively. As the slurry is being applied in the field crops, it replenishes soil nutrients more than FYM and to some extent replaces the need for chemical fertiliser (AEPC/RUDESA, 2002). However, users of other types of RET did not report an increase in crop production as experienced by the biogas users.

Vegetable, Butter and Local Wine Production of Biogas User Households

The biogas user hhs main income generating activities were agricultural based like vegetable, butter (*Gheeu*) and local wine (*Rakshi*) production. Fertiliser required for vegetable production is being substituted by slurry produced from biogas. On an average each hh produces 180 kg of vegetable and the estimated revenue from its sales is Rs. 1,620. The biogas user hhs reported that vegetable productivity has increased by about 7.5 per cent due to the use of slurry. Also money is saved from the decrease in use of fertiliser. The average hh income from butter and local wine is estimated at Rs. 5,000, and both of these products are highly energy intensive.

Potential Income Generating Activity Identified for Biogas Users

Though none of the interviewed users reported engaged in non-agricultural IGAs, they reported to possess knowledge that power generated can be used to operate food grain processing mills. Further they were found willing to accept suitable technology to harness energy generated from biogas. They suggested use of biogas in other income generating activity like food grain hauling, grinding and expeller through community ownership rather than individual ownership. At the community level adequate supplies of dung are maintained and at the same time the entire community reaps benefits.

Some of the feasible incomes generating activities identified are vegetable production, livestock products, poultry farming and agro-processing, which require substantial amounts of labour and energy inputs. The biogas technology as suggested by many studies has been helpful in relieving members from daily hh chores. The time saved can thus be used in these activities. However, proper skill training needs to be imparted to the beneficiaries for producing marketable production. This of course requires initial capital requirement, which these days is readily available from rural lending institution. In view of the above, biogas development program needs to be implemented in a more integrated approach.