

DISSERTATION ABSTRACT

VIABILITY OF BIOGAS PRODUCTION AND ITS UTILIZATION IN RURAL

BANGLADESH

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Bangladesh is one of the lowest energy consuming countries in the world. More than 85 percent of its total energy comes from traditional biomass energy which lead to environmental degradation and ecological imbalance and adverse human health impacts too. Biogas is one of the fastest growing renewable energy sources in the world. The main objective of the study was explore the viability of biogas production and its utilization in a rural Bangladesh context. The field work was based on structured questionnaire and focus group discussion (300 biogas plants till 2011) among representative Biogas and Non-Biogas Households. The major attempt of this study is to examine the long run factors affecting the biogas technology adoption in rural areas in Bangladesh. The study entailed biogas used only for cooking purpose whereas almost all the Non-Biogas Households dependent on fuelwood for regular cooking purpose. The non-burning of fuelwood due to use of biogas provided an annual saving of BDT 16,008 per household. The study also showed representative users saved 23,816 workdays from which 9,162 workdays contributing IGA. Each biogas plant reduced approximately 3 tonnes of GHG per year and could bring a Carbon Abatement Revenue earn under Clean Development Mechanism. The study came across with divergent views from the plant owners. Individuals described their overall experience regarding biogas function. In this connection this study has tried to assess the viability of biogas production in rural Bangladesh. Three major biogas plant sizes (2.4 m³, 3.2 m³ and 4.8 m³) are found in the studied areas in Bangladesh. These biogas plants are treated as small, medium sized and large for better understanding of this analysis. The average annual cost and benefit per

biogas plant are 19,241 BDT and 31,030 BDT, respectively. Decision-making tools including NPV, IRR, PBP and BCR are applied for calculating the future value of costs and benefits of biogas plants. Some fixed base-criteria for analysis were included, like the lifespan of a biogas plant, which is 15 years, the discount rate of 12%, interest on loans of a 8% flat rate, a 4% maintenance cost, a 4% depreciation cost. Six assumptions including with subsidy, without subsidy, health benefits, and savings of time to use for income generation are considered in financial estimation and the remaining assumption, carbon trading, is considered in economic estimation and analyzed thoroughly with the help of decision-making tools.

Considering all assumption analyses, Biogas plants can be installed throughout the country wherever there are a sufficient number of cattle or poultry. The study showed that biogas has a lot of multidimensional advantages, internal and external, social and economic, direct and indirect. As a result, dissemination of biogas technology in rural areas of Bangladesh contributes not only to improvement of health conditions but also mitigates environment degradation as well as positively impacting the socio-economic situation in both local and global arenas. According to different decision-making tools including NPV, IRR, PBP and BCR all suggest that the positive potential to install at least one small scale biogas plant in or around the home. The country will be benefited in several dimensions in the long term. Thus, biogas users provide two-fold benefits concerning the issue of earning foreign currency as well as preparing for a sustainable environmental atmosphere all over the world.

Finally, biogas plants show very interesting potential considering the financial, economic and environmental issues and therefore should be introduced or expanded in Bangladesh with expectations of further benefits for both individual households and the nation as a whole.

Based on the study, the installation of biogas plant as an alternative energy source could be recommended. Slurry utilization prospects and use of biogas for lighting should be promoted to enhance beneficial aspects of biogas.