

## **Assessing Costs/Benefits of Biogas Plants Development at Household: A Case Study in Three Selected Areas of Tigray Regional State of Ethiopia**

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Biogas has micro and macro benefits/costs for any country. Hence, this study was conducted with its objective: to assess costs/benefits of biogas at household level. The study was conducted in three selected Weredas of Tigra, Ethiopia, Africa, where the project is widely adopted. The study used primary and secondary data. The sample size included 150 households selected via random sampling with 93% response rate. The primary data were collected through questionnaire and analyzed using cross tab with phi, Cramer's value (for nominal scales) and spear man rho's correlation for ordinal scales). The key findings indicated that most of the female household heads living in rural areas with no access to electricity are using biogas. The size of digester of the biogas ranges from 6 to 8 cubic meter. The total construction costs of biogas ranges from USD 1,230.00 to 1,400.00, out of which, only USD 230.00 to 350.00 is covered by the users and the remaining is covered by Government Organizations and Non-Government Organizations. Biogas is used for lighting, baking, boiling water, cooking and coffee making activities at household level. Location, owing cattle, feeding way of cattle, using as source of income and getting subsidy are main decision elements for adoption of biogas. Sustainable waste management, saving cooking and cleaning time, fertilizer production, and saving kerosene and labor are benefits which increase as per size of digester of biogas with less than 5% of *p*-value. Thus, concerned bodies need to adjust their incentives and their interest rate on loan, which is taken by users to cover portion of biogas initial cost, as per the capacity and demand of the users via focusing on the decision elements.

**Keywords:** Benefits, biogas, costs, energy, sustainable