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Opportunities for Biogas Utilisation in East Africa: A Case Study of Uganda

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Abstract

Loss of nutrients and minerals along value chains of fruits and vegetables are a major constrain in East Africa and contributes to an increased food insecurity and social problems such as malnutrition, unemployment and poverty. Within the FruVaSe-Project ('Fruits and Vegetables for all season' supported by the German Federal Ministry of Food and Agriculture (BMEL)) improvements for fruit and vegetable processing are developed to address these problems. To improve cyclic processes, wastes from the processing should be utilised in a biogas process. This renewable energy technology is accepted as key technology for energy transition to reduce traditional wood fuel use and replace it by renewable energy sources especially for cooking purposes. Although the economy in East African countries (EAC) is strongly characterised by agriculture and high amounts of utilisable wastes, the biogas dissemination is still quite limited. In a mixed methodological approach, consisting of literature review, expert interviews and a SWOT analysis challenges in the implementation of biogas projects in the EAC and Uganda were identified.

The results show a high rate of failure and abandon of biogas installations on the household level due to a lack of sustainable availability of raw materials, a need for a high level of expertise, labour input, high initial costs and limited financial access. A further major obstacle is the increase in household water requirement of up to 88 % for installed systems. Additionally, the suitable pre-treatment of the substrate can be challenging for the user, e.g. due to changing mixing ratios within seasonal changes of available substrate. The project target to use jackfruit wastes as possible feedstock is considered to be limited due to nearly no cultivation on a commercial scale. Therefore, interviewed experts recommend the production of biogas from fruit and vegetable processing or from other organic wastes at institutional or commercial level, rather than in households. To improve the planning phase a stakeholder participation method should be used to create ownership through participation, and site selection tools should be used to evaluate biogas opportunities. Further investigations should focus on water-reduction and/or -recycling, improving pre-processing methods for varying feedstock and on detailed analysis of jackfruit for chemical compositions, amount of wastes and co-digestion opportunities, as well as on business models for commercial use of biogas systems.

Keywords: Abandon factors, biogas, domestic, failure, fruit processing, mixed methods, renewable energy, waste utilisation, water

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